ENVIRONMENTAL ASSESSMENT BOARD

Ontario

ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARINGS

VOLUME: 136

DATE: Tuesday, April 21, 1992

BEFORE:

HON. MR. JUSTICE E. SAUNDERS	Chairman
DR. G. CONNELL	Member
MS. G. PATTERSON	Member

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ENVIRONMENTAL ASSESSMENT BOARD
ONTARIO HYDRO DEMAND/SUPPLY PLAN HEARING

IN THE MATTER OF the Environmental Assessment Act, R.S.O. 1980, c. 140, as amended, and Regulations thereunder;

AND IN THE MATTER OF an undertaking by Ontario Hydro consisting of a program in respect of activities associated with meeting future electricity requirements in Ontario.

Held on the 5th Floor, 2200 Yonge Street, Toronto, Ontario, Tuesday, the 21st day of April, 1992, commencing at 10:00 a.m.

VOLUME 136

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THE HON. MR. JUSTICE E. SAUNDERS	Chairman
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MS. G. PATTERSON	Member

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TIME NOTATIONS

--Upon commencing at 10:15 a.m.

THE REGISTRAR: Thank you for coming to order. This hearing is now in session. Please be seated.

THE CHAIRMAN: Before we recommence the cross-examination on Panel 9, is there anything we need to do about Panel 10, Mr. Campbell?

MR. B. CAMPBELL: I think there are a couple of matters about which parties wish to make submissions. I think the general one --

THE CHAIRMAN: Would it be better if they made the submission? Would that be the best way to do it?

MR. B. CAMPBELL: I did not intend to make anybody else's submissions, just the topic areas, I think, have more to do with the timing of Panel 10. I think Mr. Shepherd has some submissions about the statement of issues. But I think it is probably more sensible to proceed by hearing the submissions first because otherwise I will be anticipating everyone.

THE CHAIRMAN: Thank you.

Who wants to make submissions? Mr. Watson? Yes.

And who else? Mr. Shepherd?

Anyone else?

Mr. Heintzman?

Anyone else?

Mr. Rodger, Mr. Starkman.

Anyone else?

Would that order be an appropriate order? Watson, Shepherd, Heintzman, Starkman.

MR. SHEPHERD: Mr. Watson has agreed that I can are precede him because my issue is different from anybody else.

THE CHAIRMAN: You can either precede or go last. You can proceed now that you are up on your feet.

MR. SHEPHERD: Mr. Chairman, our concern is a brief one.

We went to a good deal of trouble in our statement of concerns to make very clear the directions we expected Panel 10 to go in, so we presented a very lengthy and detailed statement of concerns.

The statement of proposed issues from Ontario Hydro gives very little indication as to whether they agree or disagree with either the relevance or materiality or focus of those concerns.

I have since corresponded and spoke with Mr. Campbell, and it is my understanding, which I wish to put on the record and I am going to ask him to

respond on the record, that none of the issues raised in our statement of concerns are challenged as to relevance; No. 2, that the materiality of each of those concerns is to be addressed in argument, not during cross-examination, and that the level of detail will be left to the cross-examination questions as they arise as has been the practice in the past. I wanted to put that on the record and ask Mr. Campbell to confirm it on the record.

THE CHAIRMAN: Your statement of concerns is comprehensive, and as you recognize, not all of the concerns are necessarily the proper subject matter of cross-examination. They are in the nature of argument or positions, for instance, so that some of them would not be the subject matter of cross-examination, I would expect. That doesn't mean that they couldn't be the proper subject matter for your evidence or for your argument. I am not suggesting that they are not relevant to those things, but they may not be questions that are appropriate to ask the witnesses in Panel 10. And that, I guess, is a matter that has to be decided when the question is asked and the submissions are made. It's very hard to deal with that in the abstract.

MR. SHEPHERD: The distinction is between

an issue, an issue raised by us in our statement of concerns, simply not being possible to be the basis for a proper cross-examination, which is one thing, and I have asked Mr. Campbell about that and I believe his answer is he cannot identify any that come within that category, but he can speak to that.

The secondary question is, within those various concerns that we have raised are there areas of potential cross-examination which would be improper, which would be properly the subject matter --

THE CHAIRMAN: Just take one example, your 1-4, specifically what form of control or oversight mechanism or process, if any, should this Board recommended or require with respect to development, evolution, implementation, or modification of Ontario Hydro's generation planning. That to me is an argumentative question which is a perfectly proper one but is one that would not be a matter of certainly extensive cross-examination on, I would have thought.

MR. SHEPHERD: Well, see, Mr. Chairman, that's the reason why I put things like that in the statement of concerns.

THE CHAIRMAN: It's quite proper in the statement of concerns. I don't quarrel with that. I am just saying it may not be the proper subject matter

of cross-examination.

MR. SHEPHERD: That is exactly the point. I believe that it is appropriate to ask the planners how should your work be reviewed and controlled. The planners are in a unique position to assist you in determining how that should be done.

I agree, I don't think I should ask them the legal question, should it be the Ontario Energy Board or somebody else. That would obviously be inappropriate, but I think it is appropriate to say what sort of control mechanism would make your work better.

MS. PATTERSON: Mr. Shepherd, for example, on the first page of your statement of concerns, it says party policy issues No. 4, and the last question is: Are existing legislative frameworks appropriate and sufficient or should new frame works be recommended. Now, how do you think that could be appropriately answered by witnesses?

MR. SHEPHERD: So, for example, I could say to Mr. Snelson, to what extent are the current systems of review of your planning activities either hindering you or helping you or not doing what is needed to be done for you. And he should be able to answer that. He should be able to say, well, you know,

if we had legislation that required us to have a specific schedule every year for planning, that would change how we planned and make it better or make it worse.

MS. PATTERSON: But this is not a Royal Commission or public inquiry and our mandate is not to recommend changes to legislation.

MR. SHEPHERD: No, indeed. But I think there is a general feeling - and maybe I am just projecting it - that one of the things this Board must consider is what sort of ongoing control mechanisms are necessary as a condition to its decision.

MS. PATTERSON: But that's within the framework of our existing legislation.

MR. SHEPHERD: It may or may not be.

It may be that you would come to the conclusion that there is no possible condition you can attach that is within existing legislation so that you have to say, for example, say you decide that a nuclear station is appropriate, you could say, yes, we approve a nuclear station but within the current legislation we don't believe there is any proper control mechanism. So it is only approved in the legislation changes; if not, you can't do it. And that's within your jurisdiction to do.

THE CHAIRMAN: But that primarily is a question for argument.

MR. SHEPHERD: Undoubtedly. I wouldn't ask Mr. Snelson whether that should be done. I only want to know the planner's perspective on control mechanisms.

THE CHAIRMAN: Thank you, Mr. Shepherd.

Mr. Campbell?

MR. B. CAMPBELL: Well, Mr. Chairman, I think the discussion that you have just had with Mr. Shepherd really illustrates vividly the precise point that I wish to make on this matter, which is that on the variety of matters that are raised, and I certainly point to that particular example because it's one I discussed directly with Mr. Shepherd, that's an area, for instance, where Hydro has said in Exhibit 452 that some regular review is or may be appropriate.

We would take the position that, to echo the words just used, that this is not a Royal Commission or legislative committee, and from a witnessing point of view, the witnesses are in no position to discuss potential legislative changes; they can certainly discuss planning processes.

My position on all of this is that cross-examiners are surely entitled to put questions to

the witnesses as to what was done in the planning process and why; if something was not done in the planning process that these witnesses will be speaking to, whether it should have been done, why or why not, all of those kinds of things. And I take it that many of my friend's question in this statement of concerns fall directly into those categories.

What I can't give him any assurance of is that until we are really in the cross-examination there may come a point on that kind of discussion where we will take a view that it is either material or not relevant to matters that are the Board's consideration and I can't give a blanket assurance in advance that in none of these areas will I ever be in that position, and in my submission it's unreasonable to expect that I could.

[10:26 a.m.]

We are content to have the matters dealt with as they arise in the course of cross-examination and as the Board has done before, and I think that's a reasonable basis on which to proceed.

I do not expect to be taking significant objection to questions that are of the nature: Is this material to the planning that you have conducted or that you should have conducted? But I do not want to

be taken as giving any blanket assurance that I will not object on grounds of materiality or relevance in any of these areas. I don't think I can give that assurance.

THE CHAIRMAN: Mr. Shepherd, do you have any further submissions?

MR. SHEPHERD: Mr. Chairman, I guess I don't understand the point of scoping if Mr. Campbell refuses to say whether an issue that is presented to him in writing, whether he disagrees with its relevance or its materiality now or not.

THE CHAIRMAN: I think there is no dispute in most of the cases, perhaps all of them, that they are relevant and material. The issue is whether they are proper subject matter of cross-examination of Panel 10. And because of the distinction that we have made between questions that are argumentative and questions which are there to elicit evidence. What the panel is there to do is give evidence. And of course there has to be some opinion also involved, opinion evidence, but when it gets into, as it sometimes does, descends into just an argument, then I think it ceases to be useful as cross-examination.

MR. SHEPHERD: Mr. Chairman, my concern is not at all the question of whether things are the

proper subject matter for cross-examination. I think that that can be dealt with at the time and you will obviously set the appropriate limits at the time.

My concern is that if Mr. Campbell looks at our statement of concerns today and he knows today that a particular issue is in his view not relevant or not material, I believe he has a positive obligation today, that's what scoping is about, to tell us that. And if he doesn't tell us that, I think we can rely on none of those issues being absolutely out because of relevance or materiality.

I understand that within the course of specific questions in cross, those points can be raised relevant to materiality but I don't believe that he, after today, should be in a position to say, well, issue No. 2, sub 7, is simply out entirely. If he doesn't say it now, I think he has had his chance. Those are my submissions.

---Off the record discussion.

THE CHAIRMAN: I think we are all of the view that we should proceed with this as we have before. Actually the final determinant of what is relevant and what is appropriate of course rests here and not with Mr. Campbell, but speaking for myself and I think for my colleagues, I don't think we

specifically could say anything in Mr. Shepherd's very comprehensive analysis we would be prepared to say at this stage are either immaterial or relevant.

But we have exercised great latitude for the first nine panels in scope of cross-examination. We have done that. Because we haven't always been sure just exactly where the cross-examiner is going, and experience tells us that it's dangerous for people in our position to try and interrupt a cross-examination if we aren't aware of where people are heading.

As the hearing progresses, of course, we may be able to narrow the strike zone a little bit so that it may be that we will be in Panel 10 a little more vigilant about what we think is helpful to us because, after all, that's the ultimate criteria here -- criterion. Dr. Connell will be cross with me if I don't correct that. [Laughter]

So I think we will proceed as we have done and that is that we will continue; and as the questions come up we will have to deal with their appropriateness at that time.

Now, then, Mr. Watson.

MR. R. WATSON: Mr. Chairman, Members of the Panel, I have a different issue dealing with timing of Panel 10. In fact, when it will start and when the

MEA can cross-examine.

THE CHAIRMAN: Just so everybody remembers, although you have already been told. We are not -- excuse me, Mr. Watson, I just have to do this. We are not going to be sitting on Thursday of this week, which is the 23rd of April, nor Wednesday of next week, which is the 29th of April, nor on May 7th, nor on May 21st, and Monday, 18th of May is a holiday.

Sorry, Mr. Watson, I just wanted to put that on the record.

MR. R. WATSON: Thank you, Mr. Chairman.

Before I get into my submissions, the MEA has two positions, the first of which I want to urge on you most strongly; that is, that we require further information at this stage and when that information is provided we will require at least four weeks before we can start our Panel 10 cross-examination. If you don't find favour with that submission, our alternative position is that we simply cannot start our cross-examination until May 18th. And I would like to go into some of the reasons --

THE CHAIRMAN: May 19th you mean?

MR. R. WATSON: May 19th, yes, indeed.

Now, Mr. Chairman, when the Update was issued, the MEA I am sure along with all of the other

intervenors consulted with its experts. And at that time we decided that a lot of information was required in order for us to try and do a preliminary evaluation of the Update. And let me draw a parallel if I may with the DSP.

You will recall that Hydro issued Exhibits 3, 4, and 6, the main Balance of Power documents. Some time after that, Hydro issued another layer of documentation, if you will, a number of exhibits, basically 60 or 70 in number.

Subsequent to that, the parties evaluated the DSP in conjunction with this first layer of documentation, and a series of interrogatories were permitted.

Now I suggest to you that we can draw a parallel between the Update and the DSP. Exhibit 452 and perhaps some of its associated documents, 452A through E, are analogous to Exhibits 3, 4, 6, the original Balance of Power documents. We have received some information and the MEA has written to Hydro on the third of February asking for, if you will, that first layer of documentation, the bare bones, the information, the background analysis. Our position is that when we have that information --

THE CHAIRMAN: There have been five -- am

I right about that? A to E of 452 have been filed.

MR. R. WATSON: That's my understanding unless there is something further. There are certainly other documents that have been produced as well: the updated load forecast, and I am sure Mr. Campbell is now rising to tell you of some of those documents.

I have no difficulty with certain documents being produced. They certainly have been. And my position though quite simply is that these form the first layer, if you will, analogous to the first layer that was produced subsequent to the filing of the DSP.

And the MEA's position is that on the 3rd of February we asked Hydro for documents which would assist in our analysis, our preliminary analysis of 452; in effect we are asking for the first layer if you will.

We asked that in the form of a letter. Hydro took the paragraphs of that letter and turned them into interrogatories. I don't want to call them interrogatories because in my submission they are simply trying to get the first layer of information, and we subsequently have to ask interrogatories when we get that information.

[10:35 a.m.]

And my main point to you today, sir, is we have not received all of that information yet. Hydro turned that letter into 39 Panel 10 interrogatories, 11 of those are still outstanding.

Now, my friend Mr. Campbell told me this morning that apparently of those 11, nine have been answered. They apparently are on their way to me, I have not received them.

He tells me that two are still outstanding. I assume he is doing his best to get those answered. The bottom line is we do not have the answers as I stand before you today.

THE CHAIRMAN: Just let me see if I understand. You are missing two of these pieces of information that you are asking for?

MR. R. WATSON: We are missing 11, sir.

THE CHAIRMAN: Assuming that nine are on their way, will have arrived in the near future, you are then missing two; is that correct?

MR. R. WATSON: That's true. That's the first hurdle to get them. The second hurdle of course is to analyze, have our experts look at them.

THE CHAIRMAN: The four week period then starts to run from that; is that what you are saying?

MR. R. WATSON: Exactly.

And in that four week period that would give us the opportunity to ask you, if you will, real interrogatories, the analytical interrogatories, in the same fashion that all of the of the parties asked interrogatories for with respect to the original DSP.

THE CHAIRMAN: Sorry to keep interrupting.

May 19th is four weeks today.

MR. R. WATSON: Yes.

Now, Mr. Chairman, my client wants to urge upon you as strongly as it can the importance of Panel 10 in this hearing. It feels that Panel 10 is in effect a hearing within a hearing. This is the culmination of all of the work that we have put in to date in dealing with Hydro's case. All of the nine panels are going to be brought together in this panel.

Many of the issues from the previous nine panels were deferred to this panel, as you can recall. And finally, this is everyone's last chance to question Hydro, and our submission quite simply is it must be a meaningful chance.

Now in order for it to be meaningful we must receive that first layer of information, and if we do not receive that first layer then in effect we will be deprived of the opportunity to ask those searching

interrogatories, those analytical type interrogatories as opposed to simply asking for documentation and information.

THE CHAIRMAN: But you received 37 of 39 - I don't know what the last two are, maybe they are major, but that's not probably a good way of measuring it - but you received substantially all the first layer.

MR. R. WATSON: Well, Mr. Campbell told me an hour or so ago that I now received the last nine out of the 11, but I haven't had a chance to look at it, sir, I haven't had a chance to send it to my experts, or have them discuss that.

THE CHAIRMAN: But you have got it.

MR. R. WATSON: I assume I will be getting it today or tomorrow, whenever the courier delivers it. I have no reason to doubt Mr. Campbell's submission.

Mr. Chairman, let me give you an example of the type of analytical interrogatories to be asked when all of this supporting information is received.

You will recall in dealing with the DSP and in the previous panels Hydro gave extensive evidence dealing with the LMSTM and the RAM models. These were used as a significant part of Hydro's

analysis of their plans.

Now, regardless of the Update, you will recall that in Panel 3 a number of the intervenors requested that Hydro conduct LMSTM runs. The consistent response was we are not going to do it now but we will consider doing it at a later date.

Now is the time, Mr. Chairman. This is the time for the LMSTM runs.

I suggest to you a classic use for the LMSTM runs would be to have Hydro conduct certain runs with or without various resources in the plant, so that the intervenors can put forward their alternative methods and have an opportunity to evaluate those alternative methods not only against the DSP, but against the Update as well. And this in a planning context is exactly the time to deal with this. This is the panel.

Now, if this was important in Panel 3 before the Update, it's of even more importance now.

A further but similar example surrounds the RAM model, you will recall that is the risk assessment model, and it helps with evaluating the competing plans. Again this modelled relied heavily on the DSP analysis. In fact, sir, if you look at Panel 6, the plan analysis, you will notice that both the

LMSTM model and RAM model are mentioned there.

Again, the intervenors should be given an opportunity to have these runs conducted by Hydro so that the planning panel makes sense and the opportunity for cross-examination can be as productive as possible.

One last example. We know that avoided cost is critical to determining the system mix. One of the 11, and I must confess, Mr. Campbell hasn't told me which of the two are still outstanding, but one of the 11 interrogatories that is unanswered deals with an analysis of how the avoided cost is affected by the Update planning philosophy.

I am sure you can appreciate, this is critical to an analysis of the Update, because as you know, avoided cost drives NUGs, it drives DSM, that relates to the system mix from which we get the reserve margin. Only when all of this comes together can we possibly look at the planning context for this hearing.

So, Mr. Chairman, my submission is, one, we must receive the outstanding information, then sufficient time must be allowed for us to evaluate that, ask the interrogatories and have Hydro respond to it with some small time for us to prepare for cross-examination, and that's the reason for the four weeks that I have been talking about.

Failing this, we will be deprived of the opportunity to conduct that analysis. I strongly urge you that the counsel table, no matter how well counsel is prepared, is simply not the time and the place to do that analysis. Hydro providing that information under cross-examination will not provide a meaningful cross-examination from an analytical point of view.

Now, sir, if you do not find favour with that submission, the MEA's alternative is that we simply cannot proceed before the 18th of May. We are proceeding now to try to prepare the cross-examination. Our experts, while this case is important to them, do have other commitments. And I have been informed that as a result of the complexity issues and their schedule, they simply will not be available to have a cross-examination and to attend on that cross-examination until the 19th of May.

As you know from our attendance at this hearing, sir, the MEA has had no difficulty with proceeding first. Ms. Morrison has sent out a draft order of cross-examination which has the MEA first. We are certainly prepared to go first in this panel; however, it is simply not feasible until 19th of May.

If you do not find favour with my first submission and suggest that this hearing must go on,

then we can proceed on the 19th. But that, unfortunately, is the earliest we can proceed.

Subject to your questions, those are my submissions.

THE CHAIRMAN: Thank you, Mr. Watson.

Mr. Heintzman?

MR. HEINTZMAN: Mr. Chairman, I won't repeat what Mr. Watson has already said about the importance of obtaining the information upon which cross-examination can proceed fruitfully, although I was going to elaborate on that I think you have the point.

So far as AECL is concerned, I would like to make three points.

The first point I am not sure is appropriate for today's discussions, it is our position that the Ontario government should be the first cross-examiner because the Update has in it much government policy and therefore it is only appropriate that the government first cross-examine.

The second point that I want to make is that we require -- four weeks is the period suggested by Mr. Watson. I think that's fair. It's the period that I mentioned in my argument concerning the motion with respect to the Update, from the time we receive

information before we could cross-examine.

It would not be appropriate for us to cross-examine before MEA and AMPCO, quite frankly, it would be a disservice to the hearing because they have been here much longer than we have. On the general issues, they are equipped to deal with them, and we will come along as best we can and deal with issues of concerns to us.

What I would like to do is hand to Mr. Lucas some new interrogatories that we filed with Ontario Hydro.

Now these were filed - and I make no apology for that - on a April 15th of last week.

Just to put that in context, Ontario Hydro filed materials following the Update, the Update being delivered on January 15th. Through February, March and April, two of the documents that they filed were filed on April 6th, and the last one on April 10th. This was filed on April 15th. The scoping decision rendered by the Board was on March 30th. In my submission, and the fact is, that this document could not have been prepared any earlier than it was.

What this interrogatory does is take the step that Mr. Watson has felt he could not yet take because the basic information wasn't available, but we

took it anyway, and that is to ask the analytical questions which will be of fundamental importance to us in the panel to come, Panel 10. What we have done at the top of the interrogatories is pose the alternatives that we will be asking about in Panel 10. Case A being the Update except replacing the Manitoba Purchase with CANDU 6s on existing site; Case B being that case except for CANDU 9s replacing CANDU 6s; the Update except replacing the Manitoba Purchase and the fossil extensions with CANDU 6s and then with CANDU 9s, and finally replacing the Manitoba Purchase, the fossil extensions and the additional demand management and NUGs in the Update over the original Plan 15 with CANDU 6s or CANDU 9s.

Now, it is fundamental to our position before Panel 10 that we have an understanding of the ramifications of those cases.

Now, the basic document of which there has been hardly any examination in this hearing but will be the foundation I would suggest of Panel 10 is Exhibit 6.

Exhibit 6 is the plan analysis. And most particularly in chapter 8 of the Exhibit 6 you will find the analysis through some 55 -- sorry, 80 pages or so of the cost of the various alternatives set forth in

the original DSP, the cost of Case 22, Case 23, Case 15, et cetera. And those cases are analyzed not just according to the cost of construction, but the probability of certain events occurring in terms of demand forecast, in terms of discount rates, et cetera.

Now, none of that is available to us with respect to the Update so far as I am aware, and yet it's the foundation to the whole analysis that one has to perform in order to compare the method now proposed in the Update with those proposed in the original plan or indeed any of these alternatives. So what we have asked for is for Ontario Hydro to perform that analysis. Our experts can't do that. They don't have the computer, they don't have the mechanisms to do that. We require Ontario Hydro to do that.

So we have asked, for instance in question one, the fundamental question, provide an analysis as set forth in Exhibit 6 for the supply set forth in the Update. We can't even proceed unless we understand how those principles which underline the DSP apply to the Update. And for each of Case A to F referred to above, assuming the demand set forth in the Update.

In other words, let's take your demand scenario, what is the plan analysis of the Update in

comparison to A, those plans which you put forward in the original DSP, and B, the apparent other alternative cases which we have postulated in cases A to F. And the document and the interrogatories proceed from there.

Question 1 in the third sentence says: Which supply scenario is the most cost-effective at the high and the various other load forecasts. And Exhibit 6 analyzes the original cases under all of those alternatives, high, high intermediate, median, low intermediate and low load forecast, whereas the Update only speaks in terms of the median case.

Now, the interrogatories proceed to analyze the Update from a number of scenarios and asks for information that would be relevant and arise out of an Exhibit 6 type of analysis.

[10:53 a.m.]

And I won't belabour reading the interrogatories to you. But they then proceed to, for instance, Interrogatory No. 7 on this list, a point which we have not been able to discern from the Update, but we have been told will be told to us in this panel, and that is: What is the amount of base power and energy assumed or required in the Update for each year up to and including 2014? Because, of course, it's the

base power element in the plan that AECL is primarily interested in.

If we go over to No. 10: What are the emissions from the supply sources referred to in the Update in each of the cases A to F above, applying the criteria in Exhibit 6? So here we are speaking about emissions. And Exhibit 6 analyzes the emissions from each of the cases.

Now, I leave that document with you. I would like to refer to paragraph 14 where we have asked questions about the additional risks associated with the Update, something that we have to have analyzed from a cost standpoint.

Paragraph 20, if I could ask you to turn to that paragraph. And in that paragraph we have referred to each of the elements that we will be suggesting have to be analyzed from a comparative standpoint in this panel. And we have asked: What analysis has been undertaken by Ontario Hydro in relation to the Update concerning the following. A, emission of gases or particulate matter, with further questions; B, the impact of the Update upon employment, the economy and the balance of trade; C, the cost of the supply; and D, any other comparative basis of analysis?

Now those are exactly the issues that chapter 17 of the original DSP analyzes; and without that information, it's not profitable for us, I submit, to cross-examine the Panel 10 witnesses.

So, Mr. Chairman, those are the questions we have asked. We require answers to them before we can embark upon cross-examination. If we could have them next week -- I am not suggesting that they are available next week, but if they were, then I would think in four weeks we could have our experts analyze the answers and be prepared to proceed with cross-examination. But until we have them and we have taken the step of proceeding to the analytical point so that we have the information on the table, until we have that information, in my submission, we should not be required to proceed with cross-examination.

THE CHAIRMAN: Now I have not had a chance, of course, to look at this, the new interrogatories that you have submitted, but they set out six cases A to F, and they deal with CANDU 6s and CANDU 9s.

And is what you are saying that Ontario Hydro should do is to take these scenarios and apply the analysis to them? Now this kind of analysis was not done, I don't think, in Exhibit 6 because -- at

least it wasn't done specifically to CANDU 6s and CANDU 9s.

MR. HEINTZMAN: It wasn't done specifically to CANDU 6s and CANDU 9s, no.

THE CHAIRMAN: So you are asking them to do an analysis they have not done before, I guess?

MR. HEINTZMAN: I am not sure whether they have done it before or not. They have certainly in their data bank we know from the nuclear panel information with respect to CANDU 6 and CANDU 9. So whether they have done this analysis and not produced it, I don't know, but yes, they have not produced this kind of analysis.

THE CHAIRMAN: I guess my question is why can you insist that they do this? If they don't, whatever consequence or inference could be drawn from it, can be drawn. But how can you insist that they make this kind of analysis?

MR. HEINTZMAN: Well, I can request the Board to so order them to do so. And if they then make submissions that it is either difficult or impossible or onerous to do so, then we can deal with it at that time. But for the moment, these are alternatives specifically mentioned by Hydro in the nuclear panel. They specifically said, we have on the page that they

set out the nuclear alternatives, these in mind. Indeed the only one that they did a lead time analysis of was a CANDU 6.

THE CHAIRMAN: But not in the context of these scenarios.

MR. HEINTZMAN: No, but Mr. Penn said that's the one that we might very well go with now. Now they can hardly say in the nuclear panel, this is the one that if push came to shove today we might very well go with and then say to this panel, but we haven't analyzed whether in fact that is the least cost alternative.

And I would have thought that this Board would say, well, you should go away and analyze that, unless there is some good reason why you shouldn't.

Now the same applies with the Manitoba Purchase. We asked a considerable number of questions during that panel about the Manitoba Purchase. We were told that we would get information in this panel, Panel 10, about the Manitoba Purchase. So far I haven't received any information about the Manitoba Purchase. Mr. Campbell tells us this morning in scoping that it's in the mail, like so many other things.

THE CHAIRMAN: You aren't suggesting it isn't if he says it is?

MR. HEINTZMAN: He has told us it's in the mail.

THE CHAIRMAN: That's a classic allusion to the fact that it isn't in the mail, but you are not suggesting that it is not --

MR. HEINTZMAN: It is of no use to me until I receive it, Mr. Chairman. That's all I'm saying.

But when I get it, I want, as I asked in the Manitoba Purchase panel, why have you selected that option rather than a CANDU 6? And that's a very relevant question. Or a CANDU 9?

Now if they come back and say, we cannot do that analysis, then I suppose the Board will have to deal with it at that time. But so far the interrogatories have been delivered and there hasn't been any suggestion that the analysis can't be done.

So, until we receive answers on those interrogatories, in my submission, we cannot proceed with the cross-examination and it is not profitable for us to do so or nearly as profitable as if we have answers which we can then -- when we have the analysis, give it to somebody to tell us what to do with it in cross-examination.

We know or we have been advised that

these are relevant questions for the purpose of questioning the witnesses in Panel 10. And it's the kind of information that only Hydro can produce because it's in their machinery, it's in their analysis. They have to produce it. Our experts can't go out and re-create - and if they did, it would be enormously expensive - the kind of computer technology that Ontario Hydro has.

So those are my submissions. I have made my submission that the Government should be the first one to proceed with cross-examination. If we were to receive this material by the end of the month and were then to proceed in the week of May 28th, I would anticipate being able to proceed at that time.

THE CHAIRMAN: Fine.

Thank you, Mr. Heintzman.

Mr. Rodger.

MR. RODGER: Thank you, Mr. Chairman.

First off, there has been some debate about the order of cross-examination. I would like to advise the Board that AMPCO is quite happy to follow the MEA for Panel 10. Our concern is that we are able to adequately prepare for that cross-examination. So I echo the comments of my friends.

I would make two other points. We also

have some outstanding interrogatories of Panel 10 and Panel 11. While Panel 11 is struck of course, they have to do with issues of contingency plans, the issue of total energy savings versus electricity savings, those types of questions. Mr. Campbell advises me that they will all be delivered to me over the course of the next couple of days, so that's certainly going a long way to help us prepare.

Perhaps, more importantly, since the Update was released by Ontario Hydro in January, there has been approximately a dozen or 13 associated documents that have been released with the Update. And AMPCO is in the position that we have tried to manage our resources very, very carefully. And as a consequence, we haven't got our experts deeply analyzing those documents, the Update and the documents surrounding the Update, until the Board made its decision with respect to the scope of the hearing.

We weren't in a position to, we didn't want to prejudge the Panel with how they were going to decide. There was a motion to end the hearing, to constrain the scope of the hearing considerably, so we wanted to wait until we found out the Board's decision until we got our experts going on that. And that has roughly been three weeks only since that has occurred.

Now the AECL has helped us considerably by offering the kind of interrogatories to you this morning which our experts would also be asking, not necessarily exactly. But I have had a chance to review them and they are certainly of the nature of our interests as well, so they have gone a long way to help us with that. We would be very interested in those responses as well.

But in the meantime, we don't want to proceed on the basis that our cross-examination for Panel 10 would do nothing but create undertaking after undertaking. And the adjournment period, after we get the responses from Hydro, will certainly enable us to prepare our cross adequately and ensure that my client's interests are going to be canvassed for this very important panel.

Those are my submissions.

THE CHAIRMAN: Thank you.

Mr. Starkman.

MR. STARKMAN: Thank you, Mr. Chairman. I guess the Coalition is in a similar position in the sense that we had our experts analyze Plan 15 and the other plans that were but forward, and we think that Hydro has not provided sufficient or timely back-up information to its 452 Update.

On the other hand, I must say we had always assumed that some of the responsibility for doing the analysis of 452 would fall ultimately on our own experts. Now that may necessitate an application for supplementary funding or otherwise, but some of the responsibility should fall and will fall on our own experts. And that's why it is somewhat strange to hear AECL saying, we think that Hydro should analyze the plans that we prefer. In other words, our client would like to promote CANDU 6s, 9s, or whatever, and Hydro should do that analysis.

We think that AECL has a certain amount of expertise in this area and certainly could begin to look at those plans because they are in within AECL's bailiwick.

I guess from our point of view we think there are problems and there are unanswered interrogatories and the hearing has gone ahead. We would like to see the hearing go ahead and we would not like to see a significant adjournment, and I guess our effort to deal with this would say that looking at where Panel No. 9 is at, it is unlikely it is going to finish before the week of May 11th, probably sometime towards the end of that week. That's taking into account the number of people yet to examine and the

number of days the Panel isn't sitting.

And so we would think that it would be appropriate -- excuse me, the week of May 4th. So that Hydro would call its evidence in chief on Panel 10 during the week of May 11th, like on May 11th or 12th.

May 14th is already set aside for discussions of intervenor issues, and that the MEA would then be able to begin its cross-examination on May 19th. That would give MEA about four weeks from now. And with respect to AECL's concerns, I haven't seen their interrogatories but they would have a somewhat longer period. I don't know what the time estimates are, and they are fourth or fifth on the list, and I presume the people before them will take several days, so they will get another week. And this seems to me to be a reasonable compromise and allows the hearing to progress, gets AECL and MEA, some of the information in, and also gives us some confidence or hope that the cross-examination will finish before the summer break because if it's put off much longer than May 19th or 20th, there is a real chance it won't finish before the summer break which I think would not be in the interests of the hearing.

I guess from the Coalition's point of view, we think, we have an interest in moving the

hearing along. There is a feeling that once large hearings like this have significant adjournments, there tends to be a lot of slippage. And the bottom line of it is that those parties with greater resources will be able to withstand longer hearings. Despite intervenor funding costs and so forth, the longer the hearing goes the more difficult our position becomes, so we would like to see as little slippage as possible, and we urge you to have Hydro produce as much information as they can as quickly as they can and then to get the hearing on.

[11:05 a.m.]

The only other point I would make on this is that AECL and MEA and AMPCO all seem to suggest if they got the answers, they need four weeks. That presumes that the answers will be, No. 1, what they are looking for, No. 2, useful, and so on, which is not entirely clear.

We don't have to get into a back and forth on it, but a lot of the answers that we have received have not been what we have expected, some of them, frankly, haven't been all that useful. So just the say we should delay to get the answer doesn't mean that it will necessarily be useful to those parties in the preparation of their case.

The last point I would just leave, and it's not really up for discussion, but we do have a concern, this is Hydro's last panel and when they are finished they will have put their case in, at least their case in chief. Now, I think everyone anticipates that the intervenors' cases will extend over a considerable period of time, and we have a concern about how the hearing process will handle the updates that Hydro will almost invariably bring out during the course of the intervenors' cases. What I am talking about here is if the intervenors' cases extend for a year, on the one hand I think everyone wants to see the updated information and have it; on the other hand, the provision of that information -- I guess the concern is, how will it come into the hearing process, what impact will have it, will Hydro call evidence about it. All the things that Mr. Campbell refers to: The updated load forecast, the new NUG plan, perhaps a 452A further update and so forth. How will that be received during the course of the rest of the hearing, or are we going to say Hydro has put its case in and it stands on the evidence that it put in as of the time it closes its case. I think it is an important matter and we should perhaps address that in conjunction with addressing the order of calling or the nature of the

intervenors' cases in May.

Those are my submissions.

THE CHAIRMAN: Did I understand that you have asked for information that you haven't received?

MR. STARKMAN: No. I think what I was referring to, Mr. Chairman, was that we have proceeded with the cross-examination on other panels when we had not received certain interrogatory answers, or if we had received them we didn't have four clear weeks to analyze them and send them to our experts. Part of that is just recognizing that there are certain logistical considerations about a hearing of this size and length.

THE CHAIRMAN: Before I ask Mr. Campbell to make submissions, is there anyone else who wants to say anything.

Mr. Rodger?

MR. RODGER: Just very briefly, Mr. Chairman, to respond to one of Mr. Starkman's comments.

It's been raised before, there is a real misconception among some of the parties here that certain parties, my client included, have a bottomless pit of resources that can be thrown at this proceeding and that cost just isn't an issue.

Well, I would advise the Board to

participate in this process has been a horrendously costly process for my client, and the reason why we are asking for an adjournment is so that we can make the most out of resources that we do have available to us.

So the argument that somehow parties who are self-funded like AMPCO, it might be a strategy or somehow be conceived to be a strategy to drag this hearing out just is isn't the case at all.

THE CHAIRMAN: Just to make sure I remember, you are not asking for an adjournment beyond what the MEA and AECL are asking?

MR. RODGER: No, we are not. Thank you.

THE CHAIRMAN: Mr. Moran?

MR. MORAN: Thank you, Mr. Chairman, just a couple of brief submissions.

Certainly Panel 10 is a key panel and I think we have to approach this one a very carefully. It's a culmination of everything we have been involved in to date and this is where we are going to balance everything.

I agree with the previous submissions that some brief adjournment might be in order to allow people to prepare and to process information. However, we are very concerned about slippage.

The information is never going to be 100

per cent, this is a planning hearing and we have to proceed on that basis, and we have to proceed on the basis that things are going to change and that there are going to be updates.

So our submission would be as far as any adjournment goes, as little as possible is what we are looking for.

Ontario Hydro has to get on with its business and we can't spend forever in this hearing before it can proceed with what it needs to do over the next considerable period of time.

The second point that I would like to make is in relation to the order of cross-examination. I am going to be very brief on this. It's been a while since we have had to argue about the order of cross-examination. But we are going last on this panel and AECL is asking for us to go first on the next one. We had to do that before and it was very difficult for us to do that.

There is an additional factor that I would like you to take into account at this point and that is that many of the advisors that I have to consult with are presently caught up in the budgeting process that the government is involved in at the moment and it is going to be extremely difficult for me

to prepare in order to go first on the next panel.

AECL, I think, is saying that we should go first because there is a lot of government policy elements involved in the next panel. In my submission, they are perfectly free to cross-examine Ontario Hydro on what they are doing to incorporate government policy into their planning process and they are perfectly free to cross-examine Hydro about the environmental implications of decisions that are made as a result of taking into account the government policy. And they are certainly free to send interrogatories to government and cross-examine the government when the government's case comes forward.

I really don't understand what difference it makes to AECL as far as those are concerned whether we go before or after them. Certainly they are going to have their own case to present as well.

The Board has indicated previously that not very much turns on the order of cross-examination. At this point I would agree with that, and all that's left then is fairness to the individual parties, and as I say, we have some specific problems about having to go first at this time. We are not married to going last but it will be very difficult for us to go first.

The final submissions are with respect to

the AECL's request to you that you require that you require Ontario Hydro to do a variety of analysis on a variety of scenarios. AECL is only one of many parties at this hearing, and if AECL gets such an order from you then it's certainly open for every other party to ask you to do the same thing. And if Ontario Hydro has to run dozens and dozens and dozens of scenarios for all of the parties involved, we are never going to get to the stage where Ontario Hydro can finish its case.

Ontario Hydro has put its case in. It had done the analysis it thinks that it requires to do in order it to get an approval. They are the proponent, this is their case. They are going to put the case to you. At some point you will have to decide if there is enough information for you to make a decision on approvals, and certainly every party will never agree that all the information that they think is required is before you, but that is not what underlies that basic decision-making process. It's up to you to decide what information you need and whether or not Ontario Hydro and the other parties have put enough information to you.

AECL has been a party from the start. If he wanted to do this analysis they certainly knew that Panel 10 was coming up far in advance of today, and at

the last moment now they want Ontario Hydro to do a lot more analysis, and in my submission I don't think it's appropriate for Ontario Hydro to have to do the scenarios for alternatives for all the other parties, including AECL.

Those are my submissions.

THE CHAIRMAN: Thank you, Mr. Moran.

Anyone else before I call on Mr. Campbell?

Mr. Campbell?

MR. B. CAMPBELL: Thank you, Mr. Chairman. Mrs. Formusa is checking a few points for me, and in the course of my submissions, when she comes back, if I could be allowed a brief moment to consult with her, there is one or two points that I wanted to check.

I would like to adopt, I guess, the spirit of Mr. Moran's submissions in this sense, that there seems to be an infinite capacity to ask questions and we have answered just under 9,000 interrogatories, we are tidying up the few that remain.

We keep getting interrogatories as demonstrated by AECL's series of questions to us. I would indicate that in the brief opportunity that I have had to review them, I must say that it would be my

submission that the nature of the questions there in many cases could well have been asked in February, not in April. I think you would have to read them and determine whether you believe that was so. I don't think there has been any magic in the intervening period that leads us to those questions.

THE CHAIRMAN: Well, some of the intervenors have said that they held off until they found out what the scope of the hearing was going to be.

MR. B. CAMPBELL: Well again, I invite you to read those questions and determine whether that is a persuasive argument in light of the questions asked. In my submission it is not.

Now, I will deal with just a few matters.

For instance, my friend Mr. Watson indicated that they were waiting for avoided costs. Well, those have been filed. The SICS have been filed as Exhibit 592. I don't know what he is waiting for.

There has been a great deal of information that has gone out. As I say, the witnesses involved in Panel 10 have been spending a great deal of time and effort to do their best in answering interrogatories, and yes, we are not quite complete yet but we are, at least amongst those questions that we

have had for any reasonable length of time, getting pretty darn close.

I would also like to echo Mr. Moran's submissions about running cases.

Mr. Heintzman made a point of these new interrogatories. I look and see six cases defined and the expectation apparently is that we would run all of these in their various variations.

---Off the record discussion.

In my submission, it is unreasonable to expect Ontario Hydro to simply run any case that intervenors may put forward. We would end up with years of work at the rate of production that we are looking at on this matter if that open-ended invitation was given.

My recollection is that when this matter was discussed around the time of Panel 3, there was some discussion of this, I think it came up in the course of submissions from CAC for example, there was some discussion of this, it was before Ontario Hydro took a position on it, it indicate that it would like to see some effort from the intervenors to try and at least coordinate a set of small - I emphasize small - set of cases that could be run that were of interest to the intervenors, and that if it received a proposal

that have type it would be prepared to consider it, and the Board should not take this as consenting to do it in an open-ended way. We would like to see a particular proposal which is what we requested at that time and we have, to the best of my knowledge, not received any such proposal following that discussion.

It is my further submission that even in the event that Ontario Hydro did agree to run a small agreed set of cases, that the appropriate use of the results of those cases is in the presentation of intervenors' cases by the intervenors. This is to explore questions that they are interested in exploring.

Mr. Moran points out quite correctly that we believe that we have run an adequate number for the planning decisions that we are making and an adequate number to meet the purposes and the intent of the Act. Of course it is open to intervenors to suggest alternatives, but I am unwilling to give an open-ended undertaking to run cases. And to the extent that Mr. Heintzman's new interrogatories which we received late last week are of that type, then he will get an answer saying that we have not run such cases.

As I say in my submissions, I think I have outlined to you the way in which we are prepared

to have this matter considered, and which, in my submission, is a reasonable way to avoid an interregnum of analysis could last for a great deal of time if the submissions before you were accepted.

If the cases have to be run in the way that Mr. Heintzman describes, and as they are described in his interrogatories, I do not believe we could get this panel started before the summer break.

I would also like to make the point strongly that the very people who are appearing on Panel 10 are the very people who have to deal with the interrogatories of the type that we are receiving. We cannot prepared Panel 10, answer interrogatories, conduct additional analysis, all at the same time. It is humanly and physically impossible. We have worked very hard to do those things between January and now in order to get as far along as we have done.

There is an enormous amount of information that has gone out in connection with the cases for the updates. There are six sets of LMSTM runs and costing data that have gone out around the cases that are set out in 452. There are all kinds interrogatories that have been answered. All of the information in Exhibit 3 has been updated for the cases that are described in 452. Tables and tables and

tables of numbers updating all of that information have gone out to intervenors, including AECL and others, the others who have spoken today.

I might just advise the Board, and I do so without wanting to be taken as having any hint of an apology in this respect, but I can advise the Board that as the changes occurred over last summer, commencing around the time -- throughout the case we have updated various information and it became clear that we would do an update, we undertook to file as soon as we possibly could a view of what the results of that update process were. We did that with Exhibit 452, knowing full well that the range of information that people would require with respect to that would have to follow on. We made a conscious decision to have the results out earlier than if we had waited until everything was in finished up and in publishable form. We worked very hard to answer interrogatories and get that information out, and in my submission, having watched the process from the inside, the people at Hydro who are involved in this have made heroic efforts to meet the information request.

As I say, I don't make that in any apologetic sense in responding to my friends, but just to advise the Board that everything that is reasonable

in terms of efforts to deal with these kinds of requests has been done.

Now, if I could turn then to my point. It is the same people that are involved, the people who are on Panel 10 necessarily have to deal with many of these issues.

I guess my greatest concern in all of this, apart from the suggestion that there is all kinds of additional work to be done, which in my submission should not be accepted, is that in my submission it would be quite unfair to put the panel in the position that they are both having to do interrogatories, basic information interrogatories, conduct initial analysis, prepare for their appearance and then appear as witnesses all at the same time.

I think we are close to getting the information requests that are before us now, or have been before us for at least up until the end of March, we are close to getting those tidied up.

[11:27 a.m.]

And in my submission it would be quite inappropriate to ask this panel to start in expectation that it would then stop and take some adjournment and then start and then have a potential of sort of starting and stopping.

These people, I think, once the panel starts, cannot be expected to fairly deal with additional information requests except as arise in the normal course. And in my submission, the information that Ontario Hydro is relying on in presenting its case, which is the proper matter of Panel 10, is available or is very close to being finalized and fully available.

THE CHAIRMAN: Well, let's just take one step at a time. When will all the material that Ontario Hydro is relying on, when will that be available? Do you know that?

MR. B. CAMPBELL: I expect that we would in that position, and in this I include interrogatories that we are trying to respond to....

Just a moment, Mr. Chairman.

---Off the record discussion.

MR. B. CAMPBELL: I think for our purposes a week is a reasonable estimate. It's hard to distinguish sometimes here between questions that we have been asked in the interim.

THE CHAIRMAN: I was thinking more of -- and you have put in documentation like Exhibit 507, for example. Are there documents like that that are forthcoming?

MR. B. CAMPBELL: I think the only material like that that is substantially forthcoming is -- I think the only one is that, as we advised the parties earlier this morning, we are trying to, on top of everything else, put together a more comprehensive witness statement of the type that we did for, I believe it was Panel 5 and 6, where we gave a more detailed outline of the matters that we would be addressing. I expect that would be available no later than the beginning of next week.

Now, it draws on, to some extent, some of the information that has gone before it obviously and been used in interrogatories, and I would think that by the end of next week there will be very few interrogatories outstanding, at least with respect to those interrogatories that were received to the end of March or somewhere around that date.

There have been a bunch, as the AECL is an example, that we have received in the last few weeks. They are not the only ones to have done this. And I can't make any promises on those large lumps that we got in the last few weeks. They have just been an additional work load that we haven't been able to deal with yet.

THE CHAIRMAN: Now, the only person that

suggested any kind of break on the hearing, that is, with the panel having to stop, was Mr. Starkman who suggested that maybe if Panel 9 evidence was finished, that Hydro could put its case in chief in, but the cross-examinations beginning with MEA wouldn't start to a later date.

Do you have any problem with that kind of a scenario?

MR. B. CAMPBELL: I don't think I do, Mr. Chairman, as long as we are dealing with sort of putting our case in around the 11th or 12th. I expect we will need two days, just a round number, if cross-examination then started the following week.

What I don't want to do is get the panel having to deal with everything all at once. Once they are under way, I think in fairness they should not have continued obligations to do substantial amounts of additional work of the types that have been requested here before you. They cannot both appear as witnesses and do that kind of thing at the same time and they are essential to doing it.

THE CHAIRMAN: I take that point. But the overriding concern, of course, is that the parties will be fairly in a position to do their cross-examination. That's the principal concern that

we have. And we have to take into account, of course, the effort that would have to be put in by the panelists to achieve that end.

MR. B. CAMPBELL: Well, Mr. Chairman, it is certainly my submission that by those dates that Mr. Starkman suggested, all of the parties should be in that position.

This inevitably is a matter of judgment, but it's also possible to go on doing analysis and running numbers to the 77th decimal place forever and never get on with the process. In my submission there will be, there probably is now and there certainly will be within a week sufficient material before the parties that they should in all fairness be in a position to go for cross-examination purposes on the 18th.

THE CHAIRMAN: That include AECL's 14-page new interrogatories which were filed or received last Wednesday?

MR. B. CAMPBELL: No, it does not, because those sets of interrogatories -- as I understand it from Mr. Heintzman, what he is looking for is not commentary about these different cases under these different questions. What he is looking for is LMSTM runs.

THE CHAIRMAN: I'm not sure that's

exactly right. I mean, I haven't read the interrogatories. I just got them this morning. I don't know if you have. But some of the questions look as if they don't need LMSTM runs; some may but some don't.

MR. B. CAMPBELL: The problem, Mr. Chairman, is that if any of them do, the problem is no different.. And I certainly heard Mr. Heintzman say he expected to see LMSTM-type runs in connection with these cases. At the minute whether I could contemplate answering some questions at a different level of detail and some questions with LMSTM level of detail, I suspect my friend Mr. Heintzman in the end would not find that very satisfactory because he has asked in each case for analysis, which I understand from his comments to be LMSTM analysis.

I don't think there is any hope for getting Mr. Heintzman's questions now that I have had an opportunity to read them, and particularly with the emphasis on LMSTM runs. I don't think there is any hope of getting that work done in two months, never mind in two weeks. It's that quantity of work. I'm not sure that AECL fully realizes what they are asking for, when they are asking for that kind of analysis for six different cases of this type.

I would also remind the Board in considering this matter that again the sense of some of the submissions has been that Exhibit 452 was, from beginning to end, all new. I would remind the Board that throughout we have been updating the evidence of every panel. It is not fair to say that Exhibit 452 is from one end to the other new. That is not correct. Much of the information base upon which the conclusions in Exhibit 452 are drawn have been spoken to in this hearing by the relevant panels and they have been fully cross-examined on, and I think that is a relevant consideration in dealing with this matter.

I think, Mr. Chairman, subject to Mrs. Formusa providing me with some wisdom as opposed to my simple verbiage on these matters, those are my submissions.

THE CHAIRMAN: Thank you.

MR. B. CAMPBELL: Thank you.

THE CHAIRMAN: Are there any parties who made submissions earlier who want to make submissions in the nature of reply. Mr. Heintzman? And anyone else? Just before I see who else. Anyone else? Just Mr. Heintzman.

MR. WATSON: I may make some brief comments after Mr. Heintzman is finished.

THE CHAIRMAN: All right.

MR. HEINTZMAN: Mr. Chairman, I am not sure that this is the time or a convenient way to analyze the issue as to whether Hydro should be required to produce an alternative analysis, whether it be LMSTM or whatever.

But I would like an opportunity at some point to address that issue, if I can make some initial comments now on it. I had anticipated that if Hydro came back and said that they either could not or would not run such and such an analysis, then that would be the time we would discuss the matter.

But let me say this initially. First off, I understood, although I was not here, that Ontario Hydro did indicate earlier that it would run alternative scenarios through their computer, if requested to do so. And it was said that, get them organized and present them. So we have done that. So that's the first point I would say.

The second is that when you look at the Update there are three ingredients for which there is no alternative analysis, at least three, and that's what our interrogatories address: the Manitoba Purchase, the fossil extensions, and the increased demand management and NUGs.

Now let's just take, for instance, the Manitoba Purchase. All we are saying is you have not presented any alternative to that, any cost alternative or indeed any alternative. I cross-examined on that at some length during that particular panel.

Now, if it's too onerous to do both CANDU 6 and CANDU 9, fine. Do CANDU 6. Tell us whether the plan is less cost-effective or more cost-effective with a CANDU 6 or two CANDU 6s brought in at the appropriate times and the computer will tell us when it should be brought in and would it be brought in the same date that the Manitoba contract would otherwise have been delivered. Presumably they will address the demand as and when required. But tell us which of those is the most cost-effective, at least we will have one alternative to look at in relation to the Manitoba Purchase. The same applies to fossil extensions. The same applies to demand management and NUGs. Just give us one alternative so that we can say, yes, that is a cost-effective way or it is not a cost-effective way.

Now, all I would like to know is, is Hydro saying it refuses to do so. If it refuses to do so, then I will be asking this Board to order it to do so unless it is impossible, which I doubt, or there is some factual reason it should not be required to run.

If it is saying it can do it but it doesn't want to, well, then I assume that the Board will direct it to do so. But I would think that this is something that we can address once we know whether Hydro has any problem in running that kind of analysis.

Mr. Campbell can say it will take two months to do so. I can't believe that they don't have computer people down there who are not going to be in this room in Panel 10 who do these kinds of things. It may be that somebody on Panel 10 will have to liaison with whoever runs those machines, but I would like to hear some evidence from somebody that they can't do an analysis of a CANDU 6 vis-a-vis the Manitoba Purchase. If they can't, it is kind of frightening that this Board is being asked to approve the Manitoba Purchase.

THE CHAIRMAN: Now, just a moment.

Given that this may be so, that you should get this information, isn't this more appropriate information for the presentation of your case than it is for cross-examination of the Ontario Hydro planners about their plan.

MR. HEINTZMAN: No, no, I have to secure admissions or the evidentiary basis from their witnesses which will permit my experts then to express their opinions. I have got to get out of Ontario Hydro

information, and particularly as you have said repeatedly, it is what these people say on the stand that is the evidence. I need to secure from those people that this is what the run says. Or it may not be runs to --

THE CHAIRMAN: As I'm saying, if they did the runs I'm not saying they will do them, but if they did them, aren't the results of those useful for your case rather than for cross-examining the Hydro witnesses.

MR. HEINTZMAN: They may be. But they will be far less useful than if I can explore with the witnesses here who are the Ontario Hydro planners, so that Mr. Campbell doesn't come back and say to my witness, well, you are just taking this out of context or this or that. Surely I am entitled, when it is Ontario Hydro that is the proponent, to get its admission from its planners that there is a more cost-effective way to attack these three issues that I have -- I mean if I'm not entitled to that, I just can't imagine what I am entitled to. That's the fundamental issue.

I am sorry that it has come along this late, but I was not going to file any interrogatories until this Panel or this Board made a decision as to

whether this hearing was going to proceed. And as soon as it did, we filed these as soon as possible. And I submit that they are perfectly proper and in fact they are the heart of this whole hearing.

MS. PATTERSON: I understand Mr. Heintzman that you are saying you can't do this work yourself?

MR. HEINTZMAN: I'm told that in order to get this information, I am told that A, it would be incredibly expensive to do it; and B, if we are to have it on a like for like basis; and indeed if that's the alternative, the Board orders that Ontario Hydro provide the funding for us to do it, I am prepared to look into it further. But I was told that it is so incredibly expensive in A and B, you are not likely to get something that is comparable and assured to be comparable by the proponent unless you run it through the same system.

But if Ontario Hydro says, we refuse to do it and it's too expensive, then I would ask an order that we be provided with the funding to go and try to do it ourselves at EPRI or wherever these programs come from. I suppose that's an alternative.

THE CHAIRMAN: Just a moment, Mr. Campbell. We are going to give you the last word, Mr.

Watson.

MR. STARKMAN: Could I just address the panel briefly on the point that Mr. Heintzman raised. I will follow Mr. Watson, if I may

THE CHAIRMAN: You can follow Mr. Watson.

MR. R. WATSON: Just briefly, Mr. Chairman. Ms. Patterson, dealing with your last question. If you will recall the evidence, the LMSTM model is a suite of programs developed by EPRI. Hydro modified that suite of programs and the difficulty with the intervenors running it is we are not -- we know there have been modifications, we don't have the precise modifications. We would require those in order to do the runs ourselves. In effect they would have to give us their model for us to do the runs. It just doesn't make sense in that context for us to do the runs. It's much more cost-efficient and time efficient for Hydro to do it.

Mr. Campbell was talking about fairness to his witnesses. And I adopt those submission, if I could. He is talking about before the hearing. They are I am sure working very hard now to prepare for Panel 10. They are working hard in trying to get this information out, to get that first layer of documentation that I referred to.

Mr. Campbell also said when Panel 10 starts, these people are not going to be in a position to deal with detailed interrogatories. And I agree, they are going to be sitting on the panel; they are going to be hard-pressed just to deal with the volume of information that each of the intervenors is going to be put them before them each day, let alone answer new interrogatories.

As a result of that, in order to be fair to them and to be fair to the intervenors, these questions have to be dealt with now and such time has to be provided now so that these issues can be resolved prior to Panel 10. Only in that way can we have a meaningful Panel 10. And in saying that, we have to receive the first layer of information that I was referring to, we have to be given an opportunity to ask the interrogatories so that we're not --

THE CHAIRMAN: Now you are getting back into your main argument again.

MR. R. WATSON: Yes, I am. And I will stop there, Mr. Chairman. You know my point.

[11:45 a.m.]

Before I sit down, there was a new point that no one has addressed, and you have raised it earlier in some of the panels, dealing with recalling

witnesses. I do not propose to deal with that point today. But I suggest to you it may come up during the evidence in Panel 10 at which time I think not only MEA but a number of other intervenors might want to talk to about question of recalling witnesses from earlier panels.

Thank you.

THE CHAIRMAN: Mr. Starkman?

MR. STARKMAN: Thank you, Mr. Chairman, I will be very brief.

I think we are working under the assumption that Hydro was not going to be required at the request of parties to do a number of runs.

If the panel is considering AECL's request, I would just like to make it very clear, we have a number of runs that we would like Ontario Hydro to do, and we will also like it to be very clear as to even on AECL's runs whose assumptions are being used, whose cost estimates are being used, so there is a number of variations of the type of requests which I assume AECL is making, because I haven't seen their interrogatories. But moreover, I would like it to be clear that if the panel is going to make this sort of order, we have a number of runs that we would like them to do as as well, and we would like the opportunity to

put those in, and we could do that in relatively short order. I am talking about today or tomorrow.

THE CHAIRMAN: Mr. Campbell referred to a discussion back in Panel 3, and I saw Mr. Shepherd vigorously shaking his head affirmatively, so I guess that was off the record.

MR. B. CAMPBELL: Well, it must be right then.

THE CHAIRMAN: I remember that there was a discussion about doing something like this and actually get access to the equipment itself. According to Mr. Campbell this morning, nothing has come of that.

MR. D. POCH: I can speak to that.

I was cross-examining Panel 3, Mr. Chairman - if I can interrupt my colleague - I was one of the people asking for, as I recall, it was the hourly outputs of the end compile or the prod tab part of their LMSTM runs, and it crossed back and forth, and in the end we sort of agreed that that, as well as I think it was sensitivities to different nuclear performance would be something that we would talk about. There was no resolution. And, indeed, we were just asking that in the next run that Hydro did, and it told us at the time it was going to be doing further runs for the Update, that the little switch be turned

on for hourly output, and that we get some broader sensitivities, and that's where it rests right now.

MR. B. CAMPBELL: No, that's not...

MR. STARKMAN: In any case, Mr. Chairman, I would just say that perhaps--

THE CHAIRMAN: I wish I hadn't raised the subject.

MR. STARKMAN: --because of disagreement no further requests were put forward. I think that is fine.

On the other hand, AECL was a party to the hearing and they didn't put it forward either.

For them to say they packaged them and they are here now, I think the idea was that all intervenors would get together and endeavour to narrow down the number of requests amongst all of the parties.

Now AECL didn't consult us before they put in their interrogatory request for whatever runs they are requesting now. So suffice it to say there has been no agreement with respect to whatever transpired in Panel 3, and I think that it is a strange result that at the last minute or at least at this time AECL can put in its request, ask that it be fulfilled, and I am just trying to indicate if that's the basis upon which the matter is to proceed, we have a number

of requests which started in Panel 3 and which has become elongated through subsequent panels that we would like to have run too. So I just thought I would draw that to your attention because it is a matter of sort of fairness as between the intervenors.

MS. PATTERSON: So I take it it's your position, Mr. Starkman, that you can deal effectively with alternative methods of carrying out the undertaking and alternatives to the undertaking without having Hydro do runs for you.

MR. STARKMAN: Well, we think there is a method of doing that. What we have been endeavouring to do is calibrate our programming to Hydro's computer runs. And that's why I guess from our point of view it's a little strange AECL says it can't be done, or they haven't done it. We have done what we think is going to be a reasonable calibration which will allow us to make our case and make our presentation.

So that's where we are at today.

MR. MONGER: Mr. Chairman?

THE CHAIRMAN: Mr. Monger, you didn't make any submissions earlier on, so I am quite not sure why....

MR. MONGER: Only because the CAC was raised in respect to what went on in Panel 3, Mr.

Chairman, I was just going to try to clarify where that discussion went, because I was actually the one that had the discussion with Ms. Harvie about organizing that process. What happened sometime between Panel 3 and 4, I think, is that it became very clear that there were going to be some significant changes released sometime around Christmas and everything was put on hold more or less, and our discussions from our end, pending the release of the updated Plan. The discussions just ended and it was simply for that reason, at least as far as they were between Hydro and CAC.

The fact is, as other people are making these requests, we intend today or tomorrow, I have them in my briefcase, to resubmit one interrogatory from Panel 3 that has that model, that request in it again, for the models to be run with respect to some price scenarios. That process just ended. I just thought I would make that clear because of the anticipated Update.

THE CHAIRMAN: Thank you, Mr. Monger?

Anybody else before Mr. Campbell?

Mr. Campbell?

MR. B. CAMPBELL: Mr. Chairman, again, there are a number of sort of permutations and

combinations around this, but I know my friend talked about, counsel for CAC, Mr. Monger talked about - it's a long morning - talked about the various runs.

My friends may have decided that they would wait to see the results of 452 before getting together and make a request. My simple point is that it has now been a considerable time from that period. The discussion clearly at the time that these models were discussed before the Board related to the parties getting together, trying to develop a small number of cases that could be run.

I will repeat but will not elaborate on my submission that the appropriate use for that is in the course of the cases being called by the intervenors.

In my submission, Mr. Heintzman's argument that he needs to have an admission of it, if we prepare it and file it, we can hardly then say that it is inappropriate if we have prepared it, particularly for this purpose, to rely on it. In effect those kinds of runs would be our best judgment based on the models of what the results of those circumstances would be and the intervenors could make whatever use they wanted out of it.

We did issue an invitation for a process

and in my submission that is the process that should be followed, not an open-ended request to have this done forever.

I also take issue with my friend Mr. Heintzman's submission that somehow the witnesses can spend two minutes a day after the hearing providing guidance to computer operators. If life was that easy we would have wrapped up this hearing a long time ago. It is not that easy.

If the witnesses are going to be expected to answer any questions on those kinds of runs, which is what I take Mr. Heintzman to say, then they have got to be sure that they thoroughly understand the assumptions, the inputs, how the particular features of the case were modelled. This is not a one, two, three, proposition. It does require knowledge and it requires certainly opportunity to exercise that experience and judgment in actually doing the runs if there is going to be cross-examination on the results.

Now, the final area that I would just comment on is my friend Mr. Heintzman seems to think that somehow there has been nothing done yet on alternatives to Manitoba Purchase, fossil extension, demand management, NUGs. I would like to address each of these in turn.

With respect to the Manitoba Purchase there has just been filed an update to the evaluation of the Manitoba Purchase. You will recall that in Panel 7 I believe an undertaking was given to do that. In order to do that the new SICs had to be produced first. They were produced and filed. The evaluation was then prepared based on the new SICs, and it gives, in my submission, Mr. Heintzman precisely the information he needs. It compares a case with or without the Manitoba Purchase, and it is based on the Update case with the assumption of CANDU 6 costs and schedules, what would Hydro do without the Manitoba Purchase. What would the world look like. That is implicitly and explicitly dealt with in the evaluation that's been filed.

With respect to alternatives to fossil extension, it's my submission that given that the evidence on the record is that the fossil extensions would make, I believe, the evidence is one year's difference to the requirement for additional major supply, and that year is the difference I guess between 2010 and 2009, and it is clear that that is late enough that there is -- in my submission, that small difference is one that the witnesses on Panel 10 are quite able to deal with and provide useful

cross-examination on. That kind of small difference, a one year in-service date for one particular piece of generation, I believe the evidence will show is not material to the planning decisions that are reflected in Exhibit 452.

In my submission, that kind of small difference, if we are going to start having to do separate analyses for each and every one of those kind of small differences we are never going to get out of the here.

With respect to the third matter that Mr. Heintzman raised, increase in demand management and NUGs. Again, in my submission, for planning purposes, both directionally and good guidance in terms of quantitatively as to the effect of the increase of demand management and NUGs, can simply be derived by looking at the original filing and the results of the planning process applied once the increase in demand management and NUGs was adopted by Ontario Hydro. That happened in the course of this hearing. We have been quite frank that the increase in demand management and NUGs have been two of the most important factors affecting the Update and the results of that are in the Update.

So he has the case before and he has the

case after. In my submission, he may not have it again to the second decimal point or third decimal point, but in terms of being able to deal with the planning issues that arise from that change, he has the information that he needs, and in some of those cases has had it for some time.

Those are my submissions. Thank you, Mr. Chairman.

THE CHAIRMAN: We now take a delayed morning break for 15 minutes and then we will come back and I would hope at that time we will be able to deal with the issues that have been raised this morning and continue what is left of the morning with the cross-examination by CEG.

THE REGISTRAR: Please come to order. This hearing will recess for 15 minutes.

---Recess at 12:00 p.m.

---On resuming at 12:15 p.m.

THE REGISTRAR: This hearing is again in session. Be seated, please.

THE CHAIRMAN: We have heard this morning a number of submissions concerning Panel 10 and the scope of the evidence on that panel. The principal issue that occupied most of the time involved a set of interrogatories that had been submitted by AECL on

April 15th last, which may require, if answered as requested, the running of a number of cases on the LMSTM or the RAM models.

The question of the availability of those models to deal with cases or propositions put up by intervenors was the subject of discussion earlier in the hearing. Those discussions apparently were suspended pending the introduction of Exhibit 452. It would seem that there is general agreement that those discussions ought to be re-commenced, AECL did not participate in them but perhaps should also participate in them when they are re-commenced.

It is an extremely complicated, difficult, time-consuming and expensive problem involving a considerable amount of detail. It seems to us, that those issues should be explored and some process agreed upon. In the absence of agreement, then we may have to be involved again.

The process may involve, not necessarily will, but may involve further evidence being presented viva voce by Hydro witnesses, even after Hydro's case has closed in order to clarify the material.

This leads to another consideration which isn't directly related to Panel 10. That is the inevitability of additional updates that will occur

after Hydro's case is closed and the way in which those updates will be dealt with. This is a dynamic situation. It is not a situation that stands still and we all have to recognize that the world is not going to wait until this hearing is completed. So that there will be, no doubt, some changes that will occur before the decision can be rendered.

We will have to deal with that as best we can. It may involve a process which would enable parties to question Ontario Hydro, even after its case is closed, on some of those matters. It may not be necessary to do that, but that is a matter on which we can't say more right now other than it is a question that has to be borne in mind.

The specific scheduling of Panel 10 then becomes a relatively simple matter, once the LMSTM issue is put to one side. We have decided that the evidence on Panel 10 should not commence any earlier than the 19th of May next and that the cross-examination should not commence any earlier than the following May 25. That would be the Monday of the following week.

As to the order of cross-examination, we will allow the Government of Ontario to remain in the place originally suggested; that is, at the end of

cross-examination. The rules of cross-examination as applied to all panels will apply to Panel 10 and in special circumstances there may be an opportunity to re-examine if the issue that has been raised could not reasonably have been raised in the cross-examination and there is in the Panel's view a sufficiently valid reason to allow that cross-examination to be reopened.

I think that deals with all the matters that came up and so we can now resume with Panel 9.

DAVID WHILLANS,
KURT JOHANSEN,
FRANK CALVIN KING,
WILLIAM JOHN PENN,
IAN NICHOL DALY; Resumed.

THE CHAIRMAN: Are you ready, Mr. Poch?

MR. D. POCH: Thank you, Mr. Chairman.

CROSS-EXAMINATION BY MR. D. POCH (Cont'd):

Q. Panel, when we left off the week before last, we had had a discussion where I think you had agreed that the probabilistic risk assessment, the DPSE, makes predictions on the reliability of systems, including safety systems, and you, Mr. King, had noted that good historical performance -- you gave the example I think it was a combination of whether or not we had seen loss of coolant accidents in association with fuel melting, if memory serves me. The fact that we hadn't for some period of time suggested to you it

would possibly be appropriate to re-evaluate assumptions used in the running of the probabilistic risk assessment.

Do you recall that discussion?

MR. KING: A. I don't recall it going exactly like that, but if we can get out the record.

Q. I don't have the transcript reference. Let me put it to you this way. I had thought there was some discussion - maybe I can jog your memory - given that the DPSE was in '85, it was at the time we were discussing the .1 to .2 cents and you indicated that if you ran that, if you constructed that model again today, it might be lower given the fact that we haven't seen any serious accidents over the last six years?

A. I recall that particular discussion, but that discussion had nothing to do with fuel melting. That was to do with --

Q. That's fine. It didn't turn on what the particular item you had seen is.

And you would agree, I take it, that if you have had bad experiences, that would also affect your conclusion?

A. The general answer to your question: There is a model and there is data that goes into that

model, and we had that discussion at that time which said that if you have more recent data, then that may impact the results of what is coming out of the model, whether that experience is better or worse, and that the risk assessment is really just a snapshot in time of the situation.

Q. We spent some time going through Exhibit 525, the summary document that we produced, looking at your actual experience in 1989, at least examples of your actual experience in '89 and '90. We examined examples of special safety system faults that Hydro categorized as reducing safety system performance below design intent. You recall that? We spent some time on that.

A. We discussed a few cases, yes.

Q. And when we broke off we were looking at process system faults, and the categories we were focusing on there were ones where there was a risk of fuel damage directly or I think the second category we were looking at was if there was in Hydro's judgment a risk of fuel damage if that process system fault had in fact been accompanied a special safety system failure. And I just wanted to pick up there if I could. There were just a couple of more examples I wanted to touch on.

In Exhibit 525, if you could turn to page 15. Mr. King, at page 15, we see a recitation of the facts surrounding an event that occurred on November 22, 1988, where at Pickering 1 it's noted an operator working with incorrect operating instructions increased reactor power from 65 to 87 per cent and that caused 36 fuel bundles to fail.

Is that consistent with your understanding of the event?

A. I am aware of this event, yes.

Q. And that would have been a type A process system fault because there was in fact fuel failure?

A. Yes. As it states here, 36 fuel bundles. It doesn't mention here what the fuel failure mechanism was. It was some slight cracking of the zircaloy fuel sheath on some of the outer elements on those 36 fuel bundles.

Q. And this, although this occurred in '88, it is included here because it was an indication that in January of '89 you were still experiencing release levels for at least iodine 131, 80 times normal release levels.

A. Well, I have dug out and I think you will see in Exhibit 519 on page 46, that's our

overheads, which they have the release levels for Pickering for both '89 and '90. And you will see that -- I will wait until you get it out.

Q. Sorry, which page were you referring to?

A. Page 46.

Q. Thank you. Yes.

A. So, I think your exhibit here suggests the iodine were of 30 times. Well, that's in '88. And I guess we would be looking at -- of the six boxes there, it is the middle one on the left is the iodine box for Pickering. And over those years '88, '89, '90, 1 per cent of the derived emission limit we are still below .1 per cent of the emission limit.

You are content, Mr. King, with the suggestion in our report that the increased elevations of iodine were related to this particular incident?

A. Yes. But I was just trying to put it in perspective. I mean 80 times a small number is still a small number. And to put it in perspective to see where it is with respect to the 1 per cent DEL target, I think this figure on page 46 gives that perspective.

Q. Mr. King, I think you had already agreed that you are driven by ALARA as opposed to this

1 per cent number; is that not the case?

A. No, this particular event is an unanticipated occurrence and hence ALARA is primarily for the anticipated occurrences.

Q. Now if you will notice there is a quote on page 15 taken from the AECB 1989 staff report. And it's noted there that:

> "Although the incident... was not a loss of regulation accident, the rate of power increase did fall within the range covered by such accidents."

And this is what I would like to focus on:

> "Since the analysis supporting operating licence applications indicate that loss of regulation would not lead to fuel damage, the fact that fuel failures occurred during this incident is of some importance."

Do I understand that correctly, Mr. King, that in effect what we saw was a contradiction of what the earlier studies had predicted would happen?

[12:35 p.m.]

A. This excerpt you have here is from the AECB report and it is consistent with my

understanding. Our analysts in the fuel area following this incident did some reanalysis because some of their previous work had suggested that they wouldn't have the stress corrosion cracking of the fuel sheaths, as I mentioned earlier.

Now that analysis that they did subsequently to this November of that, I am aware that it went on but I am afraid that I don't know the results of that analysis.

Q. That is fine, Mr. King. I am not so concerned with the details of the particular problem. Just that this is an example where your safety analysis was shown in reality, when we had a particular incident, not to have performed. The world didn't unfold as you predicted and so you are going back to revisit that analysis; is that fair?

A. Well, the whole history of events that occur is that you gain knowledge from events that occur, and sometimes you have to correct your models when you predict the future events. This has been going on for 30 years in this business and I am sure it will continue to go on.

Q. Fine.

A. But this particular event, the heat transport system is still fully intact, that area.

Q. You are not differing with the observation made in the AECB staff report and my understanding of it as I have expressed it to you then?

A. This excerpt here, yes, I understand that to be the situation.

Q. And you agree with my analysis of it as I just put to you a moment ago. This was an example where your safety system, your safety analysis did not predict the stream of events?

A. That's correct.

Q. If you could turn to page 21 of the report, we had touched upon this earlier, and this was the discussion of jumpers or operating memos, and I don't want to that I can you through that again, but I did want to draw your attention to the comment that appears after the first indented quote where it's observed that the operation and maintenance record at Bruce "A" led the AECB to relicence the facility for only a one-year period in 1989 rather than the unusual two-year licence which they have been giving you, and that they were not yet satisfied that maintenance standards could meet the licence conditions. In fact, the second quote which is attributable to the AECB staff indicates that they were concerned that the planned rehabilitation program for Bruce "A" may be

unachievable and the effects of aging plant components will acquire greater safety significance if that current maintenance backlog situation, current as it was then, continued.

First of all, can you confirm that for us?

A. That being? You had two points. You referred to two...

Q. First of all, yes, that in fact you only got a one-year licence and it was linked to this maintenance situation.

A. Yes. As I am sure you had here, you had the AECB annual report for that year and there are areas in operations and maintenance where they were not happy with, and rather than the normal two-year licence renewal, we got a one-year licence renewal that year.

Q. And do you agree with the AECB's observation that if the maintenance wasn't improved, two possibilities could arise: One, that the Bruce "A" rehabilitation program could be unachievable, and second, that the effects of aging plant components in the absence of an improvement in that maintenance regime could acquire greater safety significance?

A. I would have to dig out the AECB report for 1990, I guess this is, to make sure of the

full context of that. The sentence sense starts: "If the current situation," I assume they prefaced that sentence by a description of the current situation, but I don't have that at my finger tips.

Q. Perhaps I could read in the previous paragraph to save you some time. It reads as follows:

> AECB staff believes that the station must improve its capacity to complete planned work on time. Although this is largely an economic concern, it does have safety significance in that important safety related maintenance and changes are jeopardized when programs slip and have to compete with requirements to operate the station.

It's those comments, and even in the absence of the AECB statement, I am interested in your opinion about whether in particular the absence of an improvement in maintenance and work management could in the AECB staff's words cause the effects of aging plant components to acquire greater safety significance?

A. With respect to that quote, at least the first part of it, if the current situation continues the planned major rehabilitation program for Bruce may be unachievable. No, I cannot confirm that

that's an AECB's impression.

I guess I would note that the following year the licence was renewed for two years, so I assume the Board believed that there certainly was improvements in the situation.

With respect to the second part of that sentence, and I will continue my reading of it, it's: "And the effects of aging plant components will require greater safety significance."

Well, I guess it relates to the former, if the major rehabilitation is unachievable, and I think I indicated that I couldn't really -- that's an AECB impression, I couldn't add any further information.

Well, if component reliability, if plant aging affects component reliability and those plant components are in systems with safety significance, then the sentence follows, or that part of the sentence follows from that.

I guess I can't add anything more than that.

Q. Mr. King, you would agree with the implicit observation of the AECB staff there that aging could lead to a safety compromise in the absence of proper response by your crews in the maintenance and

refurbishment, in the regard to maintenance and refurbishment?

A. Reliability of components has to be maintained to a certain level. It does not necessarily mean it's to the same level that they are at in early years in operation because there is some allowance for aging later on.

But you just can't treat it in a general way. I can't say that there is a significant impact on Bruce safety because of some particular situation which I haven't quantified.

Q. Mr. King, I am just asking a much more general question. You have just indicated that reliability can decline with aging, reliability of systems, and I take it you would agree that reliability of your systems is a very important aspect of your approach to safety. You have to make assumptions about the reliability. We have been through this.

A. The reliability of important safety systems.

Q. Fine.

A. There are many, many systems in the planet. And that paragraph you just read me, the preceding paragraph to this one here in the AECB report, I seem to recall, referring to things mainly of

an economic nature, something like that.

Q. Yes, I think they were drawing the point that they are mostly economic, but that this would impinge upon safety if allowed to continue. That's what I am asking you about.

A. I would think that if the station would be in a situation where they have a lower level of resources for maintenance than they would like and they have to prioritize maintenance, the systems which have a more important safety role would get more of their resources than systems that would have less of a safety role. So it isn't a given that if you have less resources for maintenance that you are going to impact safety.

MR. DALY: A. I would like to confirm that point, too. That is essentially the stations priority ranking, in that the safety systems do get the priority maintenance first.

Q. Why you think the AECB is so concerned about the 800 jumpers, or whatever it is, if safety is never compromised?

MR. KING: A. What 800 jumpers are we talking about?

Q. Well, I am looking at the quote at bottom of the page. Perhaps we should just show how we

get there.

First of all, our report does note, as you pointed out, that they did give you a two-year licence conditional on a detailed plan and progress report and maintenance and operational improvements be filed.

Do you agree that with me there was a condition placed on that?

A. I'm not aware of that, I haven't checked. I just know that it was a two-year licence.

Q. And they go on to observe that Ontario Hydro is indeed determined to make improvements but still has major steps to make and is facing significant technical problems with pressure tubes and steam generators which are competing for resources. And then they go on to point out that Hydro had not provided a sufficient budget to run the station properly. And there is the quote I would like to point you to:

> AECB staff has some concerns that there has not yet been any significant reduction in work backlogs. For example, in 1990 less than half of the planned equipment preventative maintenance program was accomplished and more than

800 jumpers remained in place beyond their review date.

Station management has not been successful in securing approval for the additional resources they consider necessary to reduce such backlogs to an acceptable level.

Mr. King, is it your opinion or is it your position, Ontario Hydro's position, that the AECB has no interest in this matter, that these observations are irrelevant to their mandate?

A. I didn't suggest that at all.

Q. You would agree with me then that the AECB views this maintenance backlog as having a safety implication or a potential safety implication?

A. Yes, that's what is in their annual report.

And I would note that we changed stations there when going to the last paragraph, we went from Bruce "A" to Bruce "B"

Q. That is fine.

And if you refer to our first volume of materials Exhibit 577 at page 29. Page 29, this is in the Fraser report prepared in the Ministry of Energy.

THE CHAIRMAN: Which is Exhibit 584.

MR. D. POCH: Yes.

Q. And under the heading Reliability and Safety, and Mr. Fraser notes halfway through:

> It is clear that the level of maintenance in Hydro's plants has been deficient in previous years, hence the need for sizable increase in staff, inadequate maintenance decreases component reliability. This in turn increases accident risk.

Would you agree with that observation?

MR. KING: A. No, I wouldn't.

Q. Are you aware that Mr. Fraser assisted Mr. Hare in the Ontario Safety Nuclear Review?

A. Yes, I am.

Why I wouldn't agree with it is based on the reason I just gave a few minutes ago. The inadequate maintenance can impact component reliability, but again you have to say what systems. If you have a lack of resources, you apply your limited resources to your safety systems first. So, just by having inadequate maintenance doesn't mean that that in turn increases accident risk.

Q. I take it that at the time of the

AECB staff's comments you had not been able to persuade them that there was no cause for concern that these maintenance backlogs had nothing to do with safety, hence their comments?

A. Well, it is just not a direct -- they have concerns about it. There is no doubt that it is stated in their reports.

Q. All right. Just before we put Exhibit 525 away, if you could turn up page 23 of Exhibit 525. After the quote under Staff Morale, the bottom half of the page we read --

A. Sorry?

Q. Page 23. This is back to 525.

A. Yes.

Q. Do you have page 23?

A. Yes, I have got it.

Q. The second paragraph under Section 2.2.1 begins: Two significant events that occurred at Bruce "B" in 1989...

And there in that paragraph are recited the events. One is that there was a shift maintenance supervisor narrowly missed being killed by a pulley assembly which crashed through his office ceiling, and a significant event report 8905. The man had just stood up to pace while talking on the phone when a

10-kilogram pulley landed on his desk. The SCR noted that the incident "most likely did not occur due to accidental circumstances." And indeed there was a police inquiry.

And in June a construction worker had a pale of liquid poured on him from above which caused extreme eye irritation and an empty pale was found on a catwalk above the location of the assault, but the attacker was not found.

Now, the reason I point to these is just to understand and ask you this question: Would these be the kinds of events picked up in your probabilistic risk assessment, or would these be the things which we could categorize as external initiators, not the kind of initiating malicious practice. It's not the kind of initiating event that your safety analysis would look at?

A. These events would not be in our risk assessment mainly because they have nothing to do with the reliability, initiating of accidents, reliability of safety systems, and we wouldn't call them external events either, but...

Q. What I am asking you is, does your safety analysis, your probabilistic risk assessment take into account accident sequences initiated by the

malicious act of an employee or of someone else?

A. They go down to reliability of components if we do not identify, in your words, malicious acts of employees resulting in the failure of components. But neither of these events had nothing to do with reliability of components.

Q. I appreciate that. You made that point and I appreciate that. I am just trying to understand your last answer. You say they go down to the level of system reliability. When you are making your estimates of systems, sub system reliability, do you include in your estimate of reliability the possibility that the somebody might go in there and maliciously disrupt matters or is that something which you don't try to model?

A. It's not modelled in the risk assessments.

Q. And just one other significant item which is not included in the '89 to '90 analysis, but just came to my attention I wanted to ask you about.

[12:53 p.m.]

My colleague is going to hand you a copy of significant development report No. 1992-2. This is what is called, it's from an AECB Board Member Document, included in the minutes of the AECB for

December 12, '91. Perhaps it should have a separate exhibit number, Mr. Chairman.

Next exhibit number, Mr. Lucas?

THE REGISTRAR: 629, Mr. Chairman.

---EXHIBIT NO. 629: AECB Board Member Document significant development report No. 1992-2, dated February 1992.

THE CHAIRMAN: Just hold on. You are identifying this as being a source of this --

MR. D. POCH: This was provided to us by the AECB, Mr. Chairman.

THE CHAIRMAN: I see. And so it says on mine "Board Meeting of February 1992".

MR. D. POCH: Sorry, I read from the first page. I have a collection of them here. In fact the page I have put in, you are correct, Mr. Chairman, is from February 27, '92.

Q. I wanted to ask you about the event described under the heading "Bruce "A" Unit 3", Mr. King, where it is noted that on January 26th of this year an unplanned shutdown of the unit occurred when a control absorber rod was dropped into the core. This occurred during maintenance following a failure of the rod to drop when tested.

I wanted to ask which rods these would be?

MR. KING: A. Well, if the AECB is using our terminology correctly, the control absorber is, first of all, it is not a shutdown system rod. There is a system in place in some of our reactors called a step-back system and there are typically four control absorber rods which the regulating system, when it detects some parameter different from where it is supposed to be but prior to the shutdown system protection for that incident, it will drop these four control absorber rods in.

We don't take credit, as I think I mentioned in my direct evidence. As an example we are not allowed to take credit for regulating system action to shut down the reactor in our safety analysis and hence you won't see this sort of -- you won't see any credit for this system in our safety analysis.

Q. Are these the kind of control rods you would have used to avoid a flux tilt as we saw spoken to I think last week?

A. No.

Q. A different system, okay. Thank you.

I have asked you earlier about the relationship of your targets for special safety system availability or unavailability. I think they are expressed as unavailability targets. And the

relationship of them to the assumptions in your deterministic and probabilistic risk assessments.

And perhaps we could turn up Volume 131 of the transcript, page 23102. I posed the question at the top of the page about this relationship and you responded that - and this was in the context of the C6 table which is the deterministic criteria - that:

> "The classification of all the design basis events which used the frequency criteria which was in the C6 table, some of them where it comes in the dual failure case would recognize that the special safety system targets existed, yes."

And I asked you:

> "It would be consistent with -- those targets are, in effect, statements of what the expectation was and is assumed to be for the purposes of that analysis?"

And your answer wasn't quite responsive to my question:

> "But it's not a given that if the unavailability targets were not met that you would classify the event any differently...."

And you showed us how the math showed that in some cases it would change your categorization and in others it wouldn't. And I just wanted to get an answer to the narrower question I posed; that is, the assumptions you make in your, say your probabilistic risk assessment, about special safety system reliabilities, those assumptions are consistent with both your design intent and your target for unavailability, which is your expectation of the availability of those systems in practice?

A. In the risk assessment if we are modelling any system, we have a large fault tree model for that system. That fault tree model addresses the unavailability, which is the short-term response, but the long-term response as well, the long-term reliability.

And into it we track the reliability of components. Into the bottom part of this large fault tree where you get down to the reliability of components, whether they are unreliable as they are taken out for maintenance or whether they failed, the targets are not reflected at all in that modelling process.

Q. You make an assumption though about reliability of every safety system?

A. No, not the system. We have --

Q. Or components.

A. At the component level.

Q. All right.

A. And it is not an assumption; it's a value that we have derived from a data base.

Q. All right.

A. On past experience.

Q. Do you use the same value that you have derived from the data base to satisfy the AECB in your deterministic analysis that these systems will in fact be available within the target levels prescribed?

A. The model is essentially the same fault tree model, but the model in the risk assessment is a larger model. In fact, for example in the Darlington probabilistic safety valuation or the Pickering risk assessment that we have ongoing right now, the model for the four special safety systems in those probabilistic studies, what we do is we don't want to prepare a completely separate model for the AECB and one for our own risk assessments, so we take the larger one in the risk assessment. There are some things that have to be pruned off of it because it is not consistent with the AECB definition, the scope of the AECB definition with respect to that

unavailability, and then we give the same model. So, the data for all the component failures should be the same.

Q. And it's that data that the AECB looked at and said, all right, here is your unavailability target that we expect you will meet; correct?

A. The targets have been the same since 1972. And with respect to that target, we do two things. We give them a submission which is predictive model, and that's a fault tree with data in it, and we say, well, we think that system is going to meet the 1 times 10 to the minus 3 years per year unavailability target.

The second thing we do is we track the performance of that system and we report that in the quarterly reports for the station.

Q. It's the AECB that sets the target?

A. That's right.

Q. All right. So what you are saying is there is not a one-to-one correlation between that target and the assumption in your deterministic model or the set of assumptions for components that comprise that system in your probabilistic risk assessment, but we would expect that they would bear some relationship

to one another.

A. Yes. The risk assessment treats long -- the biggest difference is the risk assessment treats long-term reliability. And what is the reliability of that one system. And really the major difference is in the emergency coolant injection system, where it is required to work for a period of weeks or months. On a shutdown system where the emission time is very short, there really is very little difference between the two models.

Q. So they would all have an availability prediction and then the PRA just goes farther and it says, and even if something is predicting to be available, it will go on and then put in an uncertainty number for -- if it will carry on for in the case of coolant for the weeks that it may be required. Is that fair?

A. There is another part of the model dealing with long-term reliability. It isn't putting in another uncertainty number. That would not be characterizing it correctly.

Q. I wasn't suggesting they needed the one nest in the other, but it's an added component if you will of the PRA?

A. The long-term reliability is an added

component.

THE CHAIRMAN: Would this be a convenient time to stop?

MR. D. POCH: Yes, Mr. Chairman.

THE CHAIRMAN: We will stop until two-thirty.

THE REGISTRAR: Please come to order. This hearing will adjourn until two-thirty.

---Luncheon recess at 1:05 p.m.

---On resuming at 2:35 p.m.

THE REGISTRAR: Please come to order. This hearing is again in session. Be seated, please.

THE CHAIRMAN: Mr. Poch.

MR. D. POCH: Thank you, Mr. Chairman.

Q. Mr. King, the deterministic criteria which you have provided us with at page 40, 41 of your overheads, is it fair to say that they are an example of what the regulator has indicated is acceptable for risk?

MR. KING: A. Only in a very general manner. We don't consider them to be risk-based criteria in the form that risk-based criteria have been developed elsewhere. We consider them to be the dose limits for various accident cases, but the dose limits go up as the probability of the sequences go down, so

there is a relationship there but. We don't call them risk-based criteria.

Q. That's consistent though, is it not, with a mathematical formula that defines risk as probability times consequences. Let me ask you that first.

A. If we could go to the C6 table, it's a decreasing risk. If you multiply the dose, allowable dose, times the frequency criteria, it isn't a constant risk per event class; it's a decreasing risk.

Q. It's not constant. There is a trend. With higher consequence accidents, less probability is acceptable and that trend is at a greater rate than simply setting the product of the two equal to a constant is what you are telling me.

A. Yes.

Q. But you would agree with me, though, that the AECB is offering you here its view of what acceptable risk is; that is, for certain categories it's saying probability times consequence shall not exceed.

A. No, they aren't saying that. They are saying events, which are the design basis events, within a certain class have these individual dose limits, period. That's what they are saying.

Q. And this phrase "design basis event", it has come up a number of times, but am I correct in my understanding that in your deterministic approach and in your probabilistic approach, you consider certain event streams or scenarios with an intent of satisfying a certain limit or obtaining a certain degree of confidence but it is never your intent to study all possible event streams?

A. That's correct.

Q. And in fact you cut it off at a very specified level; isn't that correct? You look at failure, dual failures, but you don't look at triple failures.

A. Within the siting guide limits, rules, that's what is on page 41 of Exhibit 519, that's true. That says you analyze single failures and you analyze dual failures, and while triple failures isn't a term which is used formally, informally people take it to be the failure of another special safety system, so there would be two failures --

Q. Simultaneous failure?

A. Yes. A process system failure combined with the failure of one special safety system and the failure of another special safety system; that would be defined informally as a triple failure. There

is no requirement to analyze these.

Q. And there is indeed some probability, theoretically, that that could occur?

A. Yes, there is, but it would be at a very low probability.

Q. In your probabilistic risk assessment, one of the products of that analysis is a set of consequence categories, consequence in terms of the degree of release and whether it's on-site or off-site and a probability attached to that group, the group of events and reliabilities that could lead to that consequence; is that fair?

A. That's generally true.

Q. And is it true that -- well, in virtually every case for significant consequence to occur you have to have more than one event out of the ordinary.

A. Generally true.

Q. And that you attach reliability estimates to components to obtain a failure rate or you otherwise obtain a probability for each sub-event and it's the product of the stream of them which determines the probability of the consequence?

A. It's the product of the stream; then it's the summation of all the possible streams--

Q. Yes.

A. --that can lead to a given consequence level.

Q. Right. Similarly in the deterministic regime, you have a probability number told to you by the AECB which you should not exceed for certain consequence-type events; that probability number would be determined by multiplying and summing the different streams.

A. No. The AECB doesn't tell us the probability of the sequences of the events. For example, if you go to page 40 and let's take Darlington licensing.

Q. Yes.

A. They would come up with, in document C6, a list of probably 100 different accident events from single failures and dual failures, and they gave us that last and they classified them into their five classes. And then they essentially asked us, if you don't think those are in the right classes, present arguments to suggest they should be reclassified, and also review the Darlington design in great detail and identify any other events that should be considered as design basis accidents and then categorize them. And we used the frequency probability criteria on page 40

of Exhibit 519 to do that classification.

Q. So, although it is not as detailed and rigorous, you or the AECB have formally or informally made an estimate of the probability of given events and categorized those events to determine what the acceptable consequence limit is.

A. No, the consequence limits -- we don't define the acceptable ones. The acceptable ones are the ones in the table right now. They don't change.

Q. The AECB has defined those?

A. Yes.

Q. They have defined the probability range that --

A. No. In fact, we have defined the probability range and they concurred that that was appropriate to do the classification.

Q. Through a process of consultation, you and the AECB agreed on associated probability and consequence numbers in those two tables.

A. Correct.

[2:45 p.m.]

Q. And all I am saying is, in determining, when you have an event stream, which line it appears in this table, someone has put their mind to

what the probability is of that event occurring to see if it's one that falls into category 1 or category 5, what have you.

A. Correct.

Q. And then similarly in that process of determining what the probability is when you want to type or categorize an event stream, whether you have done it formerly or informally, the logic is the same in as in the PRA analysis, you would multiply the sub probabilities embedded in the stream, and then if there were a number of ways to get to the same result you would add the different products?

A. I will accept that for now just depending on where you are going, but that was a simplified explanation of it.

Q. I understand that you don't actually do it in the same detailed way in this approach, the deterministic approach, as you do in the PRA where it's much more explicit. You made that point and I accept that point. Is that your reservation?

A. Okay, for now.

Q. So, in an event stream for which a probability has been calculated, and perhaps we should speak to the PRA side of things since it's more explicit there. If any one component or special safety

system for which you have attached a reliability or probability of failure number to, is found to be less reliable than the initial estimate you used in your calculations in the PRA, the number at the end of that event stream for risk goes up proportionately, doesn't it?

A. No, not necessarily. If you have a category and a risk assessment which is defined as a certain level of consequence, whether that consequence is in plant, releases from the core or ex-plant, what we call our ex-plant release category, there are various sequences and there are thousands of sequences that could lead to those.

Q. I was speaking of an individual sequence, just so we are on the same --

A. An individual sequence would typically start with an initiating event, loss of feed water, and you would also have to have some other component failures, perhaps a couple of component failures in two different shutdown systems, if that was the type of sequence. But you are at the component level -- and there may be a human error and there may be a maintenance outage of some component in that stream. You may have five different little failures in that sequence and there may be thousands of sequences.

Just because one of your reliability numbers for one component and one sequence is different, then it won't necessarily -- perhaps it will affect that one sequence.

Q. Yes.

A. If you are a doing a summation of all of these there may only be out of those thousands of sequences, your bottom line may be dominated by five or 10 sequences.

Q. I think I understand your caution there.

I was speaking for a given sequence, it doesn't matter how many terms are in the sequence, if one of those terms changes, the unreliability of one of the components which is in that sequence, the probability of that sequence occurring goes up in proportion to that particular number?

A. That's right.

Q. Now, I understand your other point, that component may not appear in every -- it is very unlikely that it would appear in every sequence that could lead to those kinds of consequences.

A. And the sequence may not be important with respect to the total probability of that consequence happening.

Q. Right. Now, when Ms. Harvie asked you how you are doing in terms of your reliability of systems, your response was, look at the record, and you mentioned that there had been about 200 reactor years and I think you had agreed that that would be a small period of time, but you said there had been no measurable health effects to the public.

A. That's generally what I said, yes.

Q. Would you agree if we are concerned about risk, it's the reliability of safety systems, that reliability is a very important factor, and that's true even if we have so far not experienced any simultaneous failures that have led to any unacceptable consequence; agreed?

A. It's the function of the frequency of the initiating event. If you have a very low probability initiating event, then the reliability of the safety systems is of lesser importance to the total sum, because it's really the total sum of the sequences which you are concerned with.

Also it depends how many other safety systems are required to fail to get to the level of consequence you are interested in. Just dealing with one special safety system you can't take any information re significance with respect to some bottom

line risk from just the increased unavailability of one special safety system.

Q. That's not the point I was making or asking you about, Mr. King.

You suggested we could look at the record, there have been no measurable health effects on the public. I am suggesting to you if what we are concerned about is risk, showing me that you have, you know, flipped a coin five times and it has come up heads doesn't say anything about whether it's going to come up heads or tails next time; does it?

A. Okay, if that's the point you are getting at, I think I made it quite clear in my direct evidence that yes, with only 200 reactor years of experience, you just can't say, well, everything has been fine for that period of time, and calendar time being 21 years or so, because you are expecting -- you wouldn't expect the sequences of concern to have occurred in that period of time. But then I think I went on to say, well, given that, let's look to see, at those 20 years and see what happened. So I think you put it in proper perspective in the direct evidence.

Q. You went on in fact to discuss the availability or unavailability of your special safety systems, as I recall. You would agree that these are

important reliability indices if what we are talking is risk, would you not?

I have heard your point, they don't translate one-to-one, bottom line risk, for the reasons that you have said, but they are, nevertheless, important indicators, would you agree?

A. We use them as important indicators but they have a lot of failings, and I have pointed out a number of these already,

Q. Yes, you have. Indeed, your response I think to Ms. Harvie's question in chief was that your are record on this was, you used word mixed. Do you recall that?

A. Yes, I do.

Q. And just, if you wouldn't mind, for a moment turning up Exhibit 529. This was the invited paper CANDU Safety Under Severe Accidents, an Overview, a paper you co-authored in that was filed in evidence I believe by AECL.

THE CHAIRMAN: 529.

MR. D. POCH: 529.

MR. KING: I have it.

MR. D. POCH: Q. There is a discussion starting on page 123 of that exhibit about Canadian safety and licencing approach.

MR. KING: A. Yes.

Q. And you talk about at the bottom of that page about this single dual failure analysis and mention that dual failures have to do with the failure as well of a special safety system. At the top of page 124 you say:

> For each class designers had to demonstrate that specified frequency and consequence targets were met.

And then below the table you say:

> The special safety systems are designed and operated to demonstrate during operation by test a dormant unavailability no greater than 10 to the minus 3 or about 8 hours per year.

Do you see that?

A. I see that.

Q. You in fact don't operate these to that, do you?

A. Well, as I think I have covered in my direct evidence, that is the target and we have not met the target every year for every system for all reactors. I think I indicated for some special safety systems it was good and some special safety systems we do not consider our record to be good.

Q. Right. You said it was mixed. But in fact would you turn up page 76 of Exhibit 578 our second set of materials.

A. What page was that?

Q. 76.

A. I have it.

Q. In light of your comment, you will note it no doubt, Ms. Kock had complied the unavailability statistics in her report, for those two years, that we went back and looked at the history of one such system for Pickering "A", the longest station in service. That's presented there at page 76, and this is the ECC, emergency core coolant unavailability as gleaned from the reports that Ontario Hydro and its Nuclear Integrity Review Committee have filed.

This is our compilation of your numbers.

First of all, perhaps, Mr. Chairman, I should get an exhibit number for this particular page.

THE CHAIRMAN: What is the next Exhibit No. please?

THE REGISTRAR: 630.

THE CHAIRMAN: So this table that is now Exhibit 630, page 76 of Exhibit 578, it's a compilation done by your client from the Quarterly Technical Reports, Ontario Hydro, and the Nuclear Integrity

Review Committee Annual Reports.

MR. D. POCH: That's correct, Mr. Chairman.

---EXHIBIT NO. 630: Page 76 of Exhibit 578, a compilation done from the Quarterly Technical Reports, Ontario Hydro, and the Nuclear Integrity Review Committee Annual Reports.

MR. D. POCH: Q. Mr. King, without having you confirm every number, do the numbers appearing here reflect your understanding of what the history has been?

MR. KING: A. In my direct evidence I referred to the last five years of experience for all of our stations. I have gone back and I looked at this table with respect to just the last five years and I can confirm that through '87, '88 '89, and '90, the material that you have reported here is correct. I can also add that in 1991 all units were within target in 1991.

Q. Mr. King, the way I read this table for this particular safety system at this station, over the 18, 19 years of history there, the unavailability has averaged from 21 times to 37 times, depending on which unit we look at, your target?

A. Well, I think the averaging is a very simplified way of looking at it. First of all, these

targets work on a year-by-year basis, and just looking at your Unit 1, the UNE column, that's the second column over the left at the bottom, that total at 1,432, I think 1,240 of that is comprised with two years out of the 18 here. So if one was doing a different type of analysis on it looking at expectation values, then of course you wouldn't just have the arithmetic average.

Q. Mr. King, you would agree though that the history has been that the range for that station has been 21 to 37 times the unavailability target. Your unavailability has exceeded your target by that factor on average for the life of those stations?

A. You are saying 21?

Q. 21, the best unit of the four is Unit 3 and it shows a 21 times, we have calculated it for on the bottom line, and the worse unit being Unit 4 37 times.

A. I see that on here. I don't think that the arithmetic average is an appropriate way to look at these numbers.

Q. You mentioned in '91 you met your targets. Would you agree that for Unit 4, say, to meet your expectation -- if we take your target as the expectation of how these things will perform over the

long haul, you would have to perform, have I got it right, you would have to perform perfectly for the next 37 years to get up to target?

A. Targets don't work that way at all. Targets are annual targets. You kind of don't move things from year to year and say you have to operate 30 years at a different level to make the average -- the system doesn't work on averages. It works on year-by-year targets.

And several of these events that you have in this table here, and I covered a number of them in -- not in this table, but perhaps some of these in some other ones. You just can't look at an unavailability and say that that system was completely unavailable.

In many cases it would not be completely unavailable. It is just a conservative criteria that we use to define unavailability leads to some very large numbers.

Q. Mr. King, I understand your point that it's not a one to one relationship between unavailability and safety.

A. Well, it's not even a one to one relationship between real unavailability and unavailability that we report to the AECB.

Q. Mr. King, this is your own Nuclear Integrity Review Committee and they have defined the term as not meeting design intent; correct?

A. Shutdown systems, shutdown systems, we have to have two trip parameters for every shutdown system. If you have an accident and we have to have two different trip parameters. For example, loss of coolant accident you may have to have low heat transfer system pressure and the high neutron power to shut the reactor down.

If we have one trip parameter for one -- if we find it unavailable, we declare that system unavailable, where in reality it would be sitting there with the other trip parameter already to shut down the reactor. Now it seems a bit non-sensical that we do this, but that is part of the system that has evolved with the regulatory body.

Q. Mr. King, in your probabilistic risk assessment there would have been a probability attached to one of those trip systems working and then a probability attached to the other trip system working and so on; correct?

A. That's right.

Q. So if one of them wasn't working the risk that your PRA indicated for that event sequence

would in fact, if we know that one of those has been misprojected, the risk for that sequence in the PRA does in fact underestimate the risk for that sequence?

A. Yes, but in the shutdown system sequences do not contribute significantly to the total risk of the plant whatsoever.

Q. All right.

A. You can't just shrug, you have to keep that perspective. They are very low probability sequences.

Q. I am not arguing about what the overall probability is. I am just saying to you, you calculate that overall probability by summing up or by multiplying a number of sub probabilities and summing them up and you have agreed with me that the probability of each of those two trip parameters would be in some of those sequences, and if one of them was misestimated ab intitio at the beginning, then you had misestimated the likelihood of that sequence occurring?

A. That's right, but it could have completely no significance to the risk of the station and I assume that that's really what you are interested in.

Q. Yes. And to know whether it has significance we would have to go back through the

entire exercise and find everywhere where that particular component appears and update the number for it and run the model and see. It's a major task. I am not going to ask you to do it.

A. No. People who work with these can -- just with their experience, if you went to them and said, what happens if this one trip parameter on this one system was unavailable, I am sure they can tell you within a few minutes what the significance to the bottom line number is.

But I brought that example up with the shutdown system not with respect to the risk assessments but with respect to the reporting of unavailability to the Control Board. When we say a shutdown system is unavailable, it is just that one trip parameter for that shutdown system is unavailable and hence we declare the whole system unavailable, and that really doesn't reflect reality because we are sitting there in most cases with another trip parameter available for that shutdown system to work.

Q. Well, Mr. King, you have already agreed that there is different categories for safety system availability, and you have categorized them, and there are better categories and worst categories, and you have already agreed, I take it you are not changing

your evidence, that there have been significant unavailabilities of systems in the higher category where it is a more meaningful unavailability in your own terms; Fair?

A. Some of them have more meaningful unavailabilities than others. No doubt about it.

[3:06 p.m.]

Q. And you agree with me that in your area of expertise, safety analysis, risk is commonly defined as probability times consequence?

A. It's commonly done that way, yes. It's not the only way.

Q. I understand that.

And when were the deterministic criteria that appear on page 40 and 41 of Exhibit 519 set?

A. Let me get my pages right. The ones on page 41 of 519 come from the siting guide. That document was issued in 1972. The ones on page 40 of 519 were issued in 1980.

Q. Okay. So in both cases they were issued well before the new Japanese data?

A. The new ICRP 60 is what you are referring to?

Q. The new consensus that is emerging about the impact of the Japanese data, as evidenced by

the ICRP.

A. In the dose to health effect relationship?

Q. Yes.

A. Yes.

Q. So the C term in the equation of risk, probability times consequence, P times C, just went up four- or fivefold? Didn't it?

A. If you are converting from sieverts to health effect, then, yes, it has gone up.

Q. And, indeed, in both your deterministic and your probabilistic, you come up with -- there are categories and there are risks estimated and they use person sieverts as the measure of consequence?

A. Yes.

Q. And to the extent that our understanding of how much damage a person sievert went up, four- or fivefold, then it's fair to say the risk as measured in person sieverts went up in terms of the ultimate consequence; fair?

A. Yes.

Q. At what point -- well, if the standards, if this results ultimately in the AECB tightening their standards for safety system

probabilities, for safety probabilities, fivefold so that we have the same product at the end in real term effect, do you have any indication of what that -- can you give us an indication of what that would mean in terms of possible redesigns of systems or added systems?

A. First of all you are saying if the AECB changes their limits and if -- sorry, if they take this into consideration -- that if they take this into consideration by changing their unavailability requirements --

Q. I wasn't focusing on unavailability requirements particularly; I am focusing on what is deemed acceptable in your deterministic or in the output of your probabilistic risk assessments. If they take the view that consequences are five times worse than thought and we want to achieve the same level of risk, that is, probability times consequence, what will that do to your future station design in terms of systems or costs to satisfy the AECB that you can in fact meet that and make whatever changes are required?

A. Just because we have a limit in the C6 on doses, just because we have that limit doesn't mean that the safety analysis that we submit have the accidents at that limit, so if the AECB - and I have no

indication whatsoever that they are even considering this - if they did change the limits, then unless you go through and look at all the accident sequences, perhaps we are a factor of five below all the limits there anyway so that would have no implication. So there is no study being done that I am aware of that -- well, that hasn't been looked at.

Q. Is it fair to say in some sequences under the deterministic approach, in some sequences you have got enough of a margin there that it may not affect you and in others it might?

A. I think you are saying if the AECB did that--

Q. Yes.

A. --and if you were near the old limit, then you would have to address that. Now, whether that involved design changes or whether that involved just re-doing the analysis because safety analysts when they do the analysis if they have showed that they are three times below the limit already, they may say, well, we will leave a lot of extra conservatism in the analysis. They are way below limit anyway.

So if somebody changes the limit, the first thing you do is you go and look at your analysis and say, have I made some real conservative assumptions

in there? And once you look at that in that way, then you would start looking at potential implications to the design.

Q. And you just couldn't tell me if some of your systems are close enough, within a factor of five of the limit, that this would be a concern or not. You simply don't know?

A. Well, if you go to exhibit, well, the Darlington safety report -- sorry, I forget the exhibit number, there is a table in Volume 3, section 1, which summarize the predictions, the dose predictions of all accidents analyzed in the safety report and compares it to the target. I would have to dig that out and look at it.

DR. CONNELL: If we are moving on from Exhibit 630, could I just put a question to Mr. King about this table.

The events that are addressed in these data seem not to be random. It looks in fact after 1976 that everything went extremely well except in Unit 4 which persisted with unavailability for several years; but otherwise from '76 right through to '87, it looks like a very good record with the sole exception of 1983, where there is an uncanny similarity in the unavailability for Units 1, 2, 3, and Unit 4 was a

little bit higher.

But perhaps more to the point. In 1988 it looks like a run of failures again with two major failures coming in 1990. Can you make any sense out of these or do they indeed seem to be random to you?

MR. KING: Given that the target, Dr. Connell, is in this case it's 26 hours a year for the system, we try to keep the unavailability less than that, the history has been that one event, one event, if you find something wrong, will take you above that.

It isn't a summation of a whole bunch of little events. Each these events and let's say in 1988 onward, I can speak to some of them, if you would like. But I would agree with you that they are random in that it's we find one problem, we solve that problem; and the next problem coming up is generally not related to the previous one. If that's what you are meaning by random.

DR. CONNELL: Well, I was really harkening back to your earlier discussion with Mr. Poch and the analyst that he cited who was showing some age-related effect on your forced outages.

MR. KING: I am just looking at some of my notes here where I have explanations for a number of these events; and of the major events in '88 onwards, I

would say none of them are age-related at all.

DR. CONNELL: We have covered some of them previously in cross-examination. The moderator room penetration that was left open after the Unit 2 retubing which allowed for flooding of the moderator pumps. We have covered the moderator pump, the sump pumps that were both found seized. That was the lack of testing reason that led to that.

Another major event was failure of a level transmitter while another one was on maintenance. Another one was an ECI recovery pump, the screen going in, protecting the pumps which sucked from the sump from debris getting into them, that was left off during maintenance. And there was some debris found in some ECR recovery pumping -- the pipe work, I should say. So I would say that they are not related to aging.

DR. CONNELL: Sorry, you cited 1991 when I was distracted. Can you just repeat what you said about it.

MR. KING: In my direct evidence I had referred to the last five years. I had gone through the last five years for all reactors, all systems, and looked at their performance against unavailability targets. And I was just updating Mr. Poch's table here and I indicated that all the four units at Pickering

"A" the ECI system, all met their targets in 1991.

DR. CONNELL: So they would have been less than three on the units cited here; is that correct? Three one-thousandths of a year?

MR. KING: Yes, that's correct.

DR. CONNELL: Thank you.

MR. D. POCH: Dr. Connell, I won't take issue with your broad categorization of things being pretty good, but I would just point you to in the middle years you pointed out there are a number of occasions where unavailability was much as 10 times the target. I just didn't want that to escape your notice.

Q. Mr. King, let's turn then to some of the numbers in your DPSE, which is the probabilistic risk assessment for Darlington. Would you turn up our first volume of background materials, Exhibit 577, at page 125.

MR. KING: A. Yes, I have that.

Q. This is taken from the DPSE, which is already an exhibit. And I apologize. I think it's exhibit -- I'm sorry, I don't have the exhibit number.

But can you confirm for me my understanding there that the first column is EPRC is ex-plant release category.

A. That's correct.

Q. And that indicates these are the different categories of consequences for scenarios which involve exposure to radiation off-site.

A. Yes, these are from smallish to largish releases off-site.

Q. I take it that zero, in fact, is the largest release category in terms of the amount of release?

A. It's potentially the largest. But we didn't do detailed analysis off-site of that.

Q. So that is the lower the EPRC category, the higher the potential consequence?

A. That's correct.

Q. Okay. And I take it there what you have done is -- this is the summation of your study. You have provided us in the second column with the frequency and then provided us with different measures of dose in sieverts or person sieverts. And I take it that the two numbers that appear at the bottom, total quantified risks, they are the same number. One is simply for one unit and one is for four units?

A. Yes.

Q. And that's the 1.8 times 10 to the minus 2 and 7 times 10 to the minus 2.

A. That's for the population.

Q. Right. So those are risk numbers. The product of the likelihood times the number of person sieverts for the entire population considered?

A. Yes.

Q. Or put another way, that's the expectation if we had these reactors running for some statistically significant time frame for hundreds and hundreds of years, on average we would expect to see that kind of exposure.

A. Well, the mean value is the expectation value of the probability distribution.

Q. And that mean value is expressed on per year basis?

A. Yes.

Q. This isn't for the life of the reactors; this is for each year?

A. Yes.

Q. If you turn back to page 123 of our material which is -- here we have the missing exhibit number. It's page 91 of Exhibit 190.

THE CHAIRMAN: Sorry, it's page 1,416 of Exhibit 190; isn't it?

MR. D. POCH: We have been looking at 1,416. Now we are going back to 1,421 of Exhibit 190.

THE CHAIRMAN: All right.

MR. D. POCH: Mr. Chairman, I have a hunch Exhibit 190 may have been an earlier compilation of excerpts. We are getting nested exhibits here, nested upon nested. But suffice it to say it's page 1,421 of the DPSE.

THE CHAIRMAN: What is the DSPE again?

MR. D. POCH: Darlington Probabilistic Safety Evaluation,

Q. Which is the probabilistic assessment for Darlington, Mr. King?

MR. KING: A. Yes.

Q. And this is where those numbers .1 to .2 cents per kilowatthour came from that we had a discussion about in earlier panels and earlier in my cross of this panel.

I take it that the economic risk, the on-site economic risk has also been provided by you and we see that under conclusions and it's $10 million for reactor year.

A. Yes.

Q. And again these are the average expectation? That's what we would expect on average to pay out every year. We may be lucky and never have to pay it out, but we may have a bad accident and have to

pay many times that out in a given year.

A. Well, the contributors to that risk are not events that would happen every year. They are low probabilities times higher consequences.

Q. Yes. And just so we understand what that number is, it's not the estimation of what the higher consequence is; if we take that higher consequence times the low probability and average it out over the life of reactor, that's what we would expect on average in a given year?

A. We don't average it over the life of the reactor; we calculate it for a certain year and it's assumed to be the same throughout the life of the reactor.

Q. Right.

In other words, if we wanted to charge customers for what the expected cost of accidents is going to be and if we imagined an infinite number of years so that we have enough time to collect it no matter when the accident occurred, we would have to charge .1 to .2 cents per kilowatthour for every kilowatthour that came from the reactor; correct?

A. No. I believe we have had a discussion about this already. I think if you go back to the record, it will be seen that the 10 to 20 cents

per kilowatthour that's mentioned in the second paragraph and hence that number is....

[3:27 p.m.]

Q. That's an AUEC number that it was being contrasted with. I am looking at the .1 to .2 cents.

A. Sorry.

Okay. Well, I believe that number .1 to .2 is just the $10 million per reactor year for one Darlington unit, number of kilowatthours in a Darlington unit and just divided.

Q. So if we wanted to collect what your expectation is of what the damages will be, then you have done the math for us and .1 to .2 cents on every kilowatthour?

A. Well, we have calculated an economic risk which is based on the various assumptions as documented in the Darlington study. I can make no comment whatsoever on the appropriateness of charging that, that was never considered in the study. It was not part of the scope of the study, and I can't make any comment.

Q. It was a hypothetical question, Mr. King. I am just saying if we decided we wanted to do that, the number we would use is .1 or .2.

A. I think you would have to look at the reasons you want to do it and what are the appropriate assumptions and whether those assumptions compare to the assumptions that we used in deriving this number.

Q. You have agreed that 10 million is your average expectation for one year for a reactor and you have agreed the .1 to .2 is the simply the amortization of that 10 million over the number of kilowatthours you produce from one reactor in a year; correct?

A. Yes. And I think we went back to the record before, I made comments on that. And we are updating the Darlington study right now. And I know what dominates that 10 million or the .1 and .2, I know what accident sequence dominates that, and that as I have indicated on the record before, is a loss of coolant accident which is a small one where emergency coolant injection comes in, there are no fuel failures at all, and the costs are associated with upgrading the heavy water because the emergency coolant injection system injects light water. And given that we have had -- we have almost doubled our reactor years of experience since this number derived, if we were doing this analysis today, and we are, we just haven't completed the update of the DPSE, that number would, in

my judgment, be significantly less.

Q. Right. And in your comments just now you mentioned that that accident scenario is what dominates the risk, and you would agree that that's an on-site economic risk basically. That's what dominates the economy valuation, this on-site --

A. Upgrading of downgraded heavy water.

Q. And that's the bulk of that all but pittance of that 10 million?

A. That's what we would consider to be on-site cost.

Q. Right. And the worst off-site release category, if we turn back to page 14-16 of your report, at 125 of ours, is this category zero, correct, EPRC0?

A. As we agreed, it's potentially the worst, but as you can see from the table, we haven't done the consequence analysis.

Q. Yes. Right

THE CHAIRMAN: Just so I am following, why is it potentially the worst?

MR. D. POCH: Because, Mr. Chairman --

THE CHAIRMAN: I was going to ask Mr. King why, he said it was potentially the worst.

MR. KING: Mr. Chairman, in the setting

up of the goals and objectives of the Darlington study back in 1982, the goals of the study were not to estimate the risk from the Darlington station. The goal of the study was to do a design review, a safety design review of the Darlington design using current probabilistic analysis methodology.

THE CHAIRMAN: My question is why, looking at table 14-16, is zero potentially the worst. That's what I am trying to get at it.

MR. KING: I am getting to that.

THE CHAIRMAN: All right.

MR. KING: And with that goal in mind, we decided that there was a class of events which are very, very low probability, that they wouldn't impact on the design of the plant. And in that period of time we didn't have consequence analysis of what we were talking before, the triple failures in the plant, for example, large loss of coolant and emergency coolant injection and loss of moderator system, those accidents are not required to be to be analyzed in licencing. We didn't have that analysis in place.

What we did do is, within the scope of the study, we assigned all those potentially worst case accidents to two different categories we call zero. One of them being fuel damage category zero which is a

release within the plant, and then there is this ex-plant release category zero is a release outside of the plant. In facts, FDC0, fuel damage category zero, is a direct contributor to the ex-plant release category. The probability is just carried over.

MR. D. POCH: Q. Mr. King, in short, if I can just interrupt, if my understanding is correct, your estimation is that if you did the work under, for example, mean population dose, for the EPRC category zero, you would have a higher number there than for the any of the other categories.

MR. KING: A. Yes. And in the Darlington study, we have made some comments regarding potential for increased consequences. And in fact, in Exhibit 507, which is our health effects document that was relevant to this panel, if you look at that table here, in this table we are looking at on page 125, the first row, the EPRC0 row, the fourth column over from the left where that one is in brackets under mean population dose, while it was not calculated in the Darlington probabilistic safety evaluation, there has been an estimate made of that number and included in Exhibit 507, the health effects document.

But to answer your question simply, Mr. Chairman, they are accidents which involve more

failures and potentially have larger consequences than the other accidents analyzed in this study.

MR. D. POCH: Q. Mr. King, you just made a reference to Exhibit 507. I can help you here. I can take it the estimate you are referring to is where you have reference at page 5-19 of that report, to the in NUREG 1150 U.S. series of probabilistic risk estimates where a population dose of about 2 times 10 to the 5 person sieverts is taken to be representative. Is that the reference?

A. No, I think it is taken to be conservative.

Q. I am reading the word that you offered in Exhibit 507, that was your word, is taken to be representative of that category, I am not saying of category?

A. It's my judgment that that number in Exhibit 507 is quite conservative with respect to our situation, but in order for completeness with respect to 507 a number was estimated.

DR. WHILLANS: A. The previous sentence clarifies that.

Q. Yes. Where it says there are no CANDU-specific dose consequences results available.

A. And the following one, then he refers

to the NUREG 1150.

THE CHAIRMAN: What page are we on?

MR. D. POCH: 5-19, Mr. Chairman.

DR. WHILLANS: 5-19. Using these PWR results for population dose is probably conservative for CANDU reactors of similar power output but serves was only as an approximate estimate.

MR. D. POCH: Q. So if we wanted to pencil in in that fourth column under mean population dose 2 times 10 to the 5th we could put a couple of squiggly lines in front to show that you wouldn't have the same kind of confidence in that number that you do in the other numbers you have provided from your own studies; fair.

MR. KING: A. That's right. I would judge that we are potentially an order of magnitude high in the 507 estimate.

Q. Right. But you haven't studied it so you don't know?

A. Based on my judgment of doing off-site consequence analysis, that's --

Q. But you haven't studied it so you don't know, do you, Mr. King?

A. We haven't published any material on that.

Q. Right.

DR. CONNELL: I would like to return to the upgrading of the heavy water for a moment. If that event were to happen, what actually would be the range of magnitude of that cost for a single incident?

MR. KING: I would have to dig that out. I could dig it out over the break, it's in the materials that I have right behind me here. If that would be okay, it will just take me a few minutes at break, if we still have a break this afternoon.

MR. D. POCH: Yes. [Laughter].

MR. KING: I wasn't sure with the way the day has gone, whether we are going on five or whether we are...

MR. D. POCH: We can join issue on this one, Mr. King. It indeed is a convenient place.

Q. Just though if I may on the same point in the transcript, the question Dr. Connell was referring to was for on-site, an on-site event that's not the same as these here we are at page 14-16 where we are talking about off-site consequences?

MR. KING: A. That's correct.

THE CHAIRMAN: Could I ask, pages 125, 126, and--

MR. D. POCH: 123.

THE CHAIRMAN: --123 of 578 seem to come from a Hydro document, but you're quite right, the reference to Exhibit 190 referred to an early compilation that you did. If someone could find the correct exhibit number for the DSPE.

MS. HARVIE: It's from the Darlington Probabilistic Safety Evaluation, Mr. Chairman, and the number is 520.18.

THE CHAIRMAN: 520.18. It hasn't been exactly promoted to an exhibit then yet.

MS. HARVIE: It's been filed along with some interrogatories. That have been given an exhibit number.

THE CHAIRMAN: 520.18. All right.

MS. HARVIE: It's an enormous document, I believe.

THE CHAIRMAN: Seven volumes.

MR. D. POCH: That's the one, Mr. Chairman.

MS. HARVIE: Bigger, Twenty.

MR. D. POCH: This is the one we brought a motion for and we are successful in seeing.

THE CHAIRMAN: All right. Is there a consensus there should be a break? We will a break for 15 minutes.

THE REGISTRAR: All rise. This hearing will recess for 15 minutes.

---Recess at 3:45 p.m.

---On resuming at 4:05 p.m.

THE REGISTRAR: This hearing is again in session. Please be seated.

MR. KING: Dr. Connell, if I could just answer your question now.

I got some material out of the DPSE report which is Exhibit 520.18, and in particular, chapter 13 of that report which is in Volume 2. If you look at the fuel damage category 9 material, in that chapter, that refers to the case of a loss of coolant accident with emergency coolant injection but no fuel failures, which would be expected to be the case in the majority of loss of coolant accidents. I think one could typically think of let's say a feeder break. A break of a 4-inch, since there is a lot of feeders, as perhaps being typical of that category.

The total costs estimated if that would occur as reported in chapter 13 is $230 million in 1987 dollars, I guess that is. That is composed of repair costs for that particular failed unit at around $18 million, heavy water processing costs of 10, or $11 million, another minor category of a million dollars,

but the majority of the costs are associated with replacement power which was estimated. Now that was estimated at $20 million but of course that's very variable, whenever the accident happened, what was the demand and what you would use for replacement power, but the estimate in the DPSE report was $200 million. So that totals up to $230 million dollars.

The frequency for that category, that fuel damage category 9 which we are talking about was estimated to be 2.3 times 10 to the minus 2 occurrences per reactor year of operation. You multiply that frequency times $230 million dollars and you get a risk of $5.2 million per reactor year. Now compare that to the $10 million per reactor year that we were referring to in page 123, I guess it was, of Mr. Poch's exhibit, this particular category, FDC 9 is over half of the total risk and is the dominant contributor to that total risk. The other eight categories combined add up to the remaining $4.2 million per reactor year of operation.

When I was referring to if we were redoing this study today, which we are, that frequency value of 2.3 times 10 to the minus 2 occurrences per reactor year would go down, because that was based on a zero event, we haven't had any events in the 100

reactor years of operation up until 1985 or so when that statistic was predicted, and we have another 100 years of reactor operation. So that frequency estimate would go down and hence the risk estimate would go down.

DR. CONNELL: Perhaps I misunderstood you but I thought you had testified earlier that the greater part of the cost was of the heavy water upgrading.

MR. KING: I had forgotten about the replacement power aspect of it.

What we is assume in this particular case is that we have four units, all four Darlington units down for four months, because this, the emergency coolant injection system is a common system to the four units. So in doing this work we had of course allowed for -- since that system was out of operation, since it's being used to cool the fuel in one reactor unit, we would have to shut down the other three units in that case, and that's in the procedures that we would do that. That would be four units down for four months, the accident unit would be down for an additional one month, and with the costs, the estimated cost to replacement power for that period of time total $200 million.

DR. CONNELL: Thank you.

MR. D. POCH: Q. Mr. King, just before the break we were noting the distinction between that category which is an on-site economic consequence with the analysis of probabilities and consequences for off-site release, which is the table public health risk estimates on page 125, and I wanted to focus on this off-site release group of consequences.

At page 126 of our materials there is a heading Significance of Public Health Risks Estimate and under it a sub category EPRC0, which indicates:

> All sequences assigned to EPRC0 exhibit either A, a potential for a large release from containment because the prerequisites of severe core damage and loss of containment function have been identified in the fault tree analysis, or B, the progression of the accident sequence is such that the mechanism of core damage is uncertain and hence the implications to containment cannot be incorporated into the fault tree logic.

First of all, you would agree that that is in effect the definition of EPRC0 consequence events?

MR. KING: A. These statements are valid.

Q. All right. And those are the events which I think you have indicated you don't quantify the consequences of in your analysis?

A. That's right.

Q. And why is that?

A. Well, I went into a discussion of that just before the break.

The purpose of the Darlington study was not to come up with a complete estimate of risk for the station. If you go back to chapter 1 of the report, it's there very clearly what the objectives were, and it is to do a design review of the plant using probabilistic methodology.

It is implied, well it is not implied, it's stated in the report that it was felt that very low probability accidents do not necessarily impact on the design of the station.

Q. And that's because risk is of course this multiplication of probability times consequence, so even though there may be a high consequence if the probability is low enough--

A. That's right.

Q. --The risk number is low?

A. Correct.

Q. Indeed, you go on in that paragraph to note:

> EPRC0 could be of potential significance to risk if the frequency of a large off-site release of radioactivity is not sufficiently small such that the estimation of consequences can be considered unnecessary.

There is a sort of triple negative. But am I understanding that correctly to mean that if the probability is quite low, then you won't look at the consequences because the assumption is the risk will still be low because of the low probability time?

A. That's correct.

Q. All right. So your health estimates in person sieverts per reactor year, and indeed the cost estimates you have given which you have already indicated don't include any significant term for off-plant, the ones you have included in the DSPE or indeed the ones you have gave to National Energy Board or anyone else, wouldn't include contributions from this EPRC0 category, would they?

[4:14 p.m.]

A. Well, as we discussed they are not in

this report. Whether it's the health effect or whether it's the economic it is not in this report. We have already covered that.

Q. Now you have pointed out that you do give us the frequency or the probability of the EPRC0 category at page 14-16 of DPSE, at our page 125, and that is 4.4 times 10 to the minus 6th?

A. Yes.

Q. And would you agree that's about 2, it is actually 2.09 times lower than the frequency of the next smallest risk category EPRC1?

A. Yes.

Q. So, would you agree that if the consequences of an EPRC0 event are at least 2 or 2.09 times the consequences of EPRC1 events, the risks attributable to EPRC0 would be comparable or greater than the EPRC1 category?

A. Well, I think that's generally correct. But if you look at the DPSE, we discuss the potential large releases within that EPRC0 category and we come up with an estimate, based on judgment, of which of those events that are contributing to the 4.4 times 10 to the minus 6th in fact have the potential, we believe, for large off-site consequences and I believe that's reported in Exhibit 507 as well. I

believe there is a number of 8.2 times 10 to the 7th per reactor year, the potential to have large releases.

There is in fact a table in the DPSE report which breaks out all the major contributors to EPRC0 and identifies the ones which have potential containment cross-links and hence have the potential to lead to large releases.

Q. Mr. King, you would agree with me if the consequences which we can attach to the -- the average consequence which we can attach to the average probability of 4.4 times 10 to the minus 6 is anything over twice that of the consequence associated with the category 1 events, then the risk from category zero is greater than the risk from category 1?

A. That's correct.

Q. And category 1 never involved both loss of reactor core structural integrity and containment impairment, which is the defining criteria for category zero; correct?

A. There are some containment impairments in EPRC1 --

Q. But not coupled with reactor core structural integrity loss; correct?

A. That's correct. We have defined fuel damage category zero as potential loss of core

structural integrity. And as I said EPRC FDC0 is a direct contributor to EPRC0.

Q. You have been kind enough in Exhibit 507 to point us to a U.S. estimate, which you have given the appropriate caveats to, for that larger consequence number.

THE CHAIRMAN: Which page is that, please?

MR. D. POCH: In exhibit, we spoke of this earlier, Mr. Chairman. It was in Exhibit 507 at page....

THE CHAIRMAN: 519?

MR. D. POCH: 519.

Q. And I have provided in our exhibit, starting at page 127, some materials from the NUREG study associated with Surry Unit 1. Now, Mr. King, can you confirm that this would be of the NUREG 1150 vintage?

A. Yes. For the assistance of the Panel, NUREG 1150 was an assessment of the severe accident risks from five stations. The NUREG 1150 document was written by the nuclear regulatory commission in the United States. They had contractors who did the analysis for each of the plants, and the analysis, the constituent analysis for each of the

plants were reported in NUREG documents. As you see, on page 127 it's a NUREG/CR, which means consultant report.

But each of these individual CR reports on each of the five stations all were put together in an overview document by the nuclear regulatory commission called NUREG 1150. And that's generally what all of these assessments are referred to as NUREG 1150, even though in this particular case it isn't NUREG 1150.

Q. This would be one of the reports which comprise NUREG 1150 then?

A. It's one of the supporting documents.

Q. Yes. Perhaps that should get an exhibit number, Mr. Chairman.

THE CHAIRMAN: How far through do we go?

MR. D. POCH: That's from 127 to page 139 and it's excerpts from NUREG evaluation of severe accident risks.

THE REGISTRAR: That will be 631.

---EXHIBIT NO. 631: Document entitled "Evaluation of Severe Accident Risks: Surry Unit 1", from the NUREG/CR-4551.

THE CHAIRMAN: Thank you.

MR. D. POCH: Q. And it's not necessary to go through this in detail, given what has been said

already, Mr. King, but if we were to turn to page 136, if we look, for example, going down the left column to SRL-07 and following, that's how they have categorized different sequences.

And if we look under the column Population Dose Entire Region, we see numbers there and on the page over, all in the range of 2 up to 4.9 times 10 to the 5th. And are those the kinds of numbers you are referring to in Exhibit 507 as being the kinds of results found in NUREG studies for these series off-plant releases?

A. Well, they didn't come from this particular table you have pointed to right here but they came from representative accidents which have large containment impairments in the NUREG 1150. And they are of that order of magnitude. And the number being in Exhibit 507 being 2 times 10 to the minus 5 person sieverts.

Q. If we are to go back to page 125 of our materials, if we were to take 2 times 10 to the 5th, and multiply it -- excuse me for one moment.

Yes, if we multiply 2 times 10 to the 5th times your mean frequency number, that is the 4.4 times 10 to the minus 6?

A. Yes.

Q. My math tells me I would get 88 times 10 to the minus 2?

A. Sounds okay but...

As I've just indicated, we wouldn't do that multiplication because that dose number comes from an estimate related to a large containment impairment. And I indicated to you a few minutes ago we would not say that that 4.4 times 10 to the minus 6 number reflected a large containment impairment. In fact, in the DPSE it's the table in chapter 14, page 8, that's page 14-8, where we suggest that the right frequency for a large release associated with a large containment impairment with a containment cross-link is 8.2 times 10 to the minus 7, and that's the number that's used in the Exhibit 507.

Mr. Penn tells me I said 14-8. I meant 14-18 is the page number the in DPSE.

Q. Mr. King, you would agree that.

THE CHAIRMAN: We don't have it, 14-18.

MR. D. POCH: I'm sorry, Mr. Chairman?

THE CHAIRMAN: We don't have these materials.

MR. KING: That's in Exhibit 520.8.

MR. D. POCH: No, we don't have those with us today.

MR. KING: No.

MR. D. POCH: Q. Mr. King, you would agree with the definition I offered you from the DPSE of EPRC category zero; that is, either a large release from containment or a progression such that you are not in a position to tell us what the release would be.

A. We had a definition for EPRC0 which we assigned sequences to and then when the study was nearing completion and in presenting the results of the study and discussing those results, we took it a further step and tried to identify those contributors to EPRC0 which had containment cross links and hence could lead to a large whole-in containment.

Q. Well, Mr. King, you would agree that each and every event in each EPRC category zero, each and every event for which the mean frequency is 4.4 times 10 to the minus 6th involves either potential for large release from containment or progression of accident sequence where you were uncertain about the implications to containment. Isn't that what your definition says?

A. Well, that was the definition when we established EPRC0, but what I'm telling you if you go to page 14-18 is the DPSE report, the same report, there is a discussion which separates the contributors

to EPRC0 into better defined categories.

Q. So, if I am to take this product of 4.4 times 10 to the 6 and multiply it by 2 times 10 to the 5th and get 88 which is 50 times the total quantified risk for all the other categories you have analyzed in this page combined, you would argue that I have included in the probability there a number of events which you say don't fall in that consequence range?

A. That's correct. And I would also point out the fact that this, I believe, the estimate of 2 times 10 to the minus 5 person sieverts that we derived purely for the completeness in this 507 exhibit, I believe that to be significantly conservatively.

Q. And indeed, Mr. King, if we were to take your frequency number for the events you say do have large consequences associated with them; that is the 8.2 times 10 to the minus 7.

A. Yes.

Q. That's roughly one order of magnitude different than the category 1 frequency? I am comparing 8.2 times 10 to the minus 7 to 9.2 times 10 to the minus 6.

A. Well, it's a factor of 20, is it not?

Q. One order of magnitude, 2 times 10 to the one. Rounding off to orders of magnitude. I think you were speaking orders of magnitude before. All right, 2 times --

A. If you divide those two numbers you will get a factor of 20, approximately.

Q. All right. And indeed the numbers which you say are high but which are the only numbers we have for significant event dose commitments, the ones from the NUREG study are 2 times 10 to the 5, that's two orders of magnitude greater than the mean population dose from your category 1 events; isn't it?

A. That's two orders of magnitude different, that number.

Q. So even if it's off by almost an order of magnitude from what we can expect from a CANDU, the consequences from category zero are greater -- I'm sorry, the risk from category zero, the product of consequence times probability is greater than from category 1; isn't it?

A. Well, I think we better get to do some numbers now. You are jumping around quite a bit. So you want to multiply --

Q. If we take 8.2 times 10 to the minus 7 and multiply by 2 times 10 to the 5th.

A. Okay.

Q. We get 2 times 10 to the minus 2; is that right, roughly.

A. No, I get 16 times 10 to the minus 2.

Q. 16 times 10 to the minus 2?

A. Yes.

Q. Or 1.6 times 10 to the minus 1?

A. Yes.

Q. And if you look at that -- so that's the risk for that using your sub-category with a much lower probability for the higher consequence events. And if we just look at the mean population risk, the last column for category 1 there, you have calculated for us at 1.2 times 10 to the minus 2.

A. No, I will agree that the risks for EPRC0 category may well be higher than the risks from EPRC1 in this table, if that's all you want. I acknowledge that.

Now the extent is just a matter of discussion.

Q. Right. But from that little calculation, they would swamp the total of all the other categories combined. And this is the category you didn't examine. Have I got that right?

A. Well, we did not quantify it. I have

made that very clear and for the reasons we made it very clear. But in Exhibit 507, we have done that estimate in a conservative manner.

Q. Now the DPSE in addition to leaving out this highest consequence category, it also leaves out a whole category of risk initiators, doesn't it? It leaves out the external initiators?

A. They were not within the scope of the study. They were being treated in the deterministic safety analysis in quite a bit of detail.

Q. So it leaves out fires?

A. That's correct.

Q. Leaves out floods?

A. I believe there is some treatment of internal flooding but it's not done in the same manner that perhaps is done in some other risk study.

Q. You would leave out turbine missiles from your turbine hall next door? A piece of the turbine breaking off and flying off.

A. They are not within the scope but again there is detailed deterministic studies in the Darlington safety report on that event.

Q. And indeed if we just turn to page 139A of our materials. This is a news report about a crack in the shaft of the rotor. And there is a

quote - which is attributable to an anonymous caller I point out -- which says that there had been a problem with the cracked shaft on the non-nuclear side of the plant and expressed his concern about what could have happened. "It could have potentially caused one hell of an accident. At 1800 rpm, the generator would have demolished itself and we would have been picking up pieces of metal off Highway 401. We are very lucky."

And then when asked for his name, he said ask Hydro if that's is true, so I am asking Hydro if that's true.

A. The turbine break up is a design basis accident for Darlington station. We consider that the overspeed protection of the turbine has failed and in fact the turbine speeds up to a rate, revolutions higher than 1800 rpm.

At some point the stress is on the shaft and the turbines. It's more the turbine side rather than the generator side we are concerned with. And we postulate a complete break-up of the turbine, and missiles come out of the turbine housing. We have examined, we define safety systems that have to be protected against those missiles. We have turbine missile walls built in between the turbine building and the safety systems.

And as I say, it is well documented in the Darlington safety report. So I would not expect any core-related damage as a result of this incident.

Q. Mr. King, I think you have made the distinction, and it's an appropriate one to make, between the deterministic study which you are just talking about now, where you have these design basis accidents, and the probabilistic assessment, which is the only number we have which tells us what the risk expectation is for these reactors.

Now if I am interested in getting a risk number to use, for example, in avoided cost, which you don't need to worry about, I would have to get it from the probabilistic risk assessment. The deterministic assessment doesn't give me an overall risk number, does it?

A. No, it does not.

[4:35 p.m.]

Q. Just carrying on with these external initiators which aren't in the probabilistic risk assessment. Aircraft crashes, is that in there?

A. No, it is not, for the same sort of reasons.

Q. And near site transportation accidents, perhaps an accident involving a train or a

truck carrying a hazardous material that would affect, if nothing else, the personnel, is that --

A. All of these accidents, the German missiles, the nearby transportation route accidents, the aircraft, they have all been studied. In fact, in probabilistic terms we looked at all the aircraft that could fly over, we even assumed that the Pickering airport was completed and all the flight routes that were there closer to Darlington than current airports, accident rates and target areas of the plant. We have different water supply systems separated by gross dimensions on the plant like hundreds of feet so they can't be impacted by aircraft crashes. And to find an aircraft crash that could cause substantial damage, we looked at that from a probabilistic point of view in coming up with a design basis accident and show that it is, you know, very, very low probability. Given that you have a very, very low probability of the initiating event, then I can say with some confidence that you are going to get a fairly low risk number.

Q. Mr. King, aren't all of these items very low probability items just like the ones we just referred to for ex-plant release category zero, but if the consequence is big enough, or if there is enough of these low probability scenarios, the risk term can

nevertheless be sizable; true?

A. If the total probability contribution and the consequences are high, theoretically you're right.

Q. And even if the probability is low, if the consequence term is high.

A. Consequence term has a limit to it. There is only so many radionuclides.

Q. And there is only so many people.

And just to complete this, though. It leaves out earthquakes too and there was a discussion of that earlier so I won't take you through it.

A. The DPSE did not include earthquakes within the scope of the analysis. Again, they are covered in detail in the deterministic analysis.

Q. Perhaps you can help me here. A document which just came to my attention today actually, which is being handed up. Unfortunately, it's not dated, but my information is this was a document presented to the AECB at its March board meeting by the AECB staff. It's a memorandum addressed to board members. It's entitled BMD, which I think is board member document, 92-58, so it's presumably the 58th such document presented in 1992.

Mr. Chairman, we saw an earlier one this

morning which was in their February batch that I think was 92-27, if I am not mistaken. So I think we can be fairly confidence that our information is correct on that.

I am wondering if you can help us, Mr. King, I read this as being a --

THE CHAIRMAN: You better give this an exhibit number.

THE REGISTRAR: 632.

---EXHIBIT NO. 632: Document entitled "BMD 92-58."

MR. D. POCH: 632, thank you, Mr. Lucas.

Q. I read this, Mr. King, as being a recommendation from the AECB staff to the Board to approve a program which amounts to $400,000 worth of study of underwater geophysical features in an effort to follow up on this concern about the three linear features, seismic linear features that were found to intersect near Darlington and Pickering which you had some lengthy conversation with with Energy Probe.

Were you aware of this?

MR. KING: A. I haven't seen this document before.

Q. Do you agree from your brief scan that that's what it appears to indicate?

A. That's generally the thrust of the

document, it looks like.

MR. PENN: A. I would like to just comment because I have some background in this sort of subject, that this is a very unusual document for the AECB. It's not dated and it is not signed in the normal way that these documents are signed.

So I look to our counsel, but I feel that we should find out a bit more about it.

Q. Well, I will see if I can help you right now.

Mr. Chairman, the only thing I can offer is it has become, after many years of battle, it has become the practice of the AECB to release materials put before their board for agenda items usually after the board has dealt with them. That package was sent out to one of my member groups and this was in it. That's all the information I have.

We will endeavour to provide you with some indication of the date or what have you, associated with this.

Mr. Penn, I take it then you are observing that this is not the typical format that we would see emerging from the AECB?

A. All I was commenting on, it's not in the format that I am used to is seeing, but maybe this

is a more modern approach. I don't know.

MR. KING: A. The format does look a bit different than the normal BMD documents, but it's not a major change. But the no date seems a bit surprising.

MR. PENN: A. Can you tell me whether this has really been before the Board, or what it is?

Q. I can only tell that you that it was sent by the AECB in the package of materials that are sent of materials that go before the Board, and we will see if there is any follow up from the AECB with respect to perhaps there is a decision which refers to this and we will see if we can provide that, Mr. Chairman, just to shed some light on this.

But, Mr. King, I take it that you would agree it's reasonable to conclude that the AECB staff, as of the date of this document, were certainly still concerned about the seismic question?

MR. KING: A. It appears that whoever wrote this document was concerned enough that they feel that it's an appropriate subject for further research.

Q. And are you familiar with either Mr. Stocker or Mr. Harvie?

A. Yes, I am familiar with Mr. Harvie.

Q. And who is Mr. Harvie?

A. Director of Research for the Atomic

Energy Control Board.

Mr. Stocker is one of his staff.

Q. All right. And just on this seismic question, what rationale was employed in choosing the design basis earthquake for Darlington? Was it based on historical experience?

A. Yes.

Q. And has there been an analysis of what higher DBEs, design basis earthquakes, would do to the cost of a future station?

A. I believe there was an interrogatory on that, I don't have the number available, and I believe the answer to that interrogatory is no, that there has not been any analysis.

Q. All right. And I think you agreed, Mr. King, earlier, a week or so ago with me, that the DPSE indeed focused on Darlington 2 and didn't consider the plant as a whole. It was a unit by unit analysis?

A. It focused on Unit 2 because that's the first unit that is in operation, and the four units are considered to be identical from a risk analysis point of view.

Q. And in fact we saw, when you gave us risk numbers, when you went to four units you simply multiplied by four.

A. That's correct.

Q. So, the consequence or probability numbers in the DPSE are for single unit accidents, they are not for multi-unit accidents. That is, you don't look at events which would simultaneously affect multiple units and, for example, tax your emergency core cooling system which you have indicated is a shared safety system?

A. I think there we probably do look at some but not others.

What I am referring to is, if we are looking at some loss of off-site power, we probably look at the impact on the reliability of on-site power from the various units and treat that differently. But if you are looking at loss of coolant accidents, no, we do not consider a loss of coolant accident happening at all four units at the same time.

Q. You would agree something like an earthquake could well affect all four units or some number greater than one unit simultaneously?

A. I don't agree that they would cause a loss of coolant accident at all four units.

Q. But whatever effect it might have, there is no reason it would only affect one and not all units?

A. That's correct.

Q. And why did you choose shared safety systems like the coolant system as opposed to separate ones? Is it simply a cost saving?

A. Yes. Well, that combined with the fact that there is in our view a minuscule chance that you would ever need to have a demand in more than one unit at any one time.

Q. But if we went to an approach where we wanted to separate out safety systems then as a further defence against simultaneous events, there would then be some cost penalty?

A. One of the reasons you have multi-unit stations is that you can share some common services for cost reasons. If you went to single unit stations you would have to have complete unitized systems.

Q. Excuse me for one minute.

Now, I am not the first to point out that you don't study these high consequence events, am I? If you turn to page 140 I think you will see excerpts from the Select Committee on Ontario affairs which was in 1980. At page 142 of our material they say the following:

One problem of failing to recognize the

third basic principle --

A. Sorry, where are you reading?

Q. I think this is highlighted in the first -- it's a large paragraph under the numbered paragraphs on page 142 of our material.

A. I have it.

Q. It says:

> One problem with failing to recognize the third basic principle is that the industry has never fully analyzed the consequences of the more improbable accidents.

That was true then and it's true now?

THE CHAIRMAN: Then being 1980?

MR. D. POCH: Yes.

THE CHAIRMAN: And this is an extract from the Safety of Ontario's Nuclear Reactors, Final Report, by the Ontario Select Committee; is that right?

MR. D. POCH: That's correct, Mr. Chairman. It's pages 140 through 146 of our materials.

THE CHAIRMAN: Perhaps it should be given a separate exhibit number.

THE CHAIRMAN: That will be 633.

---EXHIBIT NO. 633: Document entitled, "Safety of Ontario's Nuclear Reactors, Final Report, Select Committee on Ontario Hydro Affairs, June 1980.

MR. D. POCH: Q. Is it fair, Mr. King, it wasn't done then and you haven't covered all -- analyzed the consequences of all the probable accidents?

MR. KING: A. There are some accidents on the far-out probability spectrum that have not been fully analyzed and documented. But that is consistent with the whole reactor regulation regime in Canada and elsewhere, not just here.

Q. And indeed, on page 144, the Committee recommended that the AECB should commission a study to analyze the likelihood and consequences of a catastrophic accident at a CANDU reactor. Did they do so?

[4:50 p.m.]

A. They have some project going right now, I believe, initiated a couple of years ago, but I'm not sure whether that's still ongoing or whether the work they had started was completed or not, but they certainly haven't published any major study on it in this subject area.

Q. At page 147 of our material in

Interrogatory No. 9.7.133.

THE REGISTRAR: That is .113.

---EXHIBIT NO. 520.113: Interrogatory No. 9.7.133.

MR. D. POCH: Q. You indicate in the response:

> "In addition to the Darlington Probabilistic Safety Evaluation, Ontario Hydro is developing a method to analyze the consequences of low frequency severe accidents (i.e. beyond design basis accidents) as part of a long-term project."

Is that study finished yet?

MR. KING: A. No, that development work is still in progress. That involves a very large effort for co-development.

Q. When would you expect that to be finished?

A. I'm not directly involved in this work. I don't expect anything to be published in the next, probably for the remainder of this year, but I don't think I can say -- I don't have the information on when there would be something published.

There are some papers in the literature on methodology that is being used. It's the

development of a code called MAAP, M-A-A-P, CANDU. It is an American-developed code which they used in severe accident work, and we bought into that whole program and hired American consultants with our own experts to develop a CANDU-specific core model which would allow severe accident analysis to proceed.

But that code development is very complicated and there is a lack of experiments, of course, to compare your results to, but there are still people working in the nuclear safety department of Ontario Hydro on that project.

Q. Does the study protocol call for a consideration of full station events like we spoke of a few moments ago? Are you aware?

A. No, it doesn't. The work is developing a detailed model of the CANDU core. Basically we would have to look at loss of coolant accidents combined with loss of emergency core cooling, and we have codes that will look at that situation and consider how the heat gets transferred to the moderator and how the moderator heat removal system works.

The next step is to assume that if the moderator system wasn't working, what happens? And there have been analyses of this type done before, namely, by Professor Rogers at Carleton University on

contract to the Atomic Energy Control Board. I forget the date of that. I'm not sure whether that was in response to the Select Committee recommendation or not.

Q. I take it your work and his doesn't consider this multi-unit question?

A. If I take what you are mean as the multi-unit question as we have discussed a few minutes ago, no, it does not. The development work is on a single unit right now.

Q. And does it consider external initiators?

A. It doesn't care what the initiator is. What it does is say, you have had the loss of coolant accident or you have had the lost of heat synch and what happens to the fuel and what are the consequences thereafter. It doesn't really care to a large degree on how that sequence got started.

Q. So it's a consequence model? It's not a risk model; it doesn't include an assessment probability.

A. You would have to combine it with an estimate of all the frequencies of getting into the various categories that that code, the MAAP CANDU code would look at consequences.

Q. And I take it that the work that was

done for ONSR similarly hasn't gone and done this assessment of all these low probability higher consequence events? We wouldn't be having this conversation now, I suppose, if that was available to us.

A. The work done for the ONSR was very specific. We were requested to do an analysis of the loss of coolant accident combined with failure to shut down at Pickering "A". That analysis was performed and submitted and --

Q. And is that the Lonergan work?

A. No, it's not. It's the Argon Laboratory in the States plus our own work, which is part of the Hare Commission exhibit. It's an exhibit in this hearing.

Q. Now the probabilistic risk assessment method, it's a method that was pioneered in the U.S.?

A. The first major application was in the WASH-1400 study by Professor Rasmussen of MIT in the early 1970s.

Q. And U.S. PRAs today do consider external initiators such as earthquakes, don't they?

A. Some of them do. Some of them don't.

Q. And do U.S. PRAs simply cut off analysis of low probability high consequence accident

scenarios?

A. It depends what the objective of the PRA is. If you are talking about the NUREG 1150, in that study the risk from five plants. Three of the plants they did not look at external initiators. In two of the plants they did look at external initiators. You have included the pages from the Surry plant which is one of the two plants they looked at: fire and seismic.

But their object is quite different. They formed this study and this NUREG 1150 study is a very -- it took them a long time, a $25 million study funded by the Nuclear Regulatory Commission. Their purpose was to look at severe accidents and what are the risks from severe accidents.

The scope of the study was quite different than the DPSE. In fact, the NUREG 1150 study started out as a severe accident study. They were just looking at consequences. And the probability part of it was what was going to be a chapter in their severe accident consequence report; in fact, it got switched around such that they said, well, you can't really look at severe consequences without a probability perspective and hence it changed to a risk assessment study with severe accident consequences being a chapter

of that.

And so they don't really look at the plant in great detail. The Surry risk assessment that you included a few pages, when they are modelling the plant and looking at developing fault trees for the systems and how systems fail, they have developed a whole set of fault trees for their plant, comprises 187 pages of fault tree analysis.

The DPSE study where we had a different objective is to go in and look at the systems in great detail to see if there are any cross-links, to make sure that the accidents won't happen in the first place, we have got 9,982 pages of fault tree analysis. So, the objectives of the study were completely different. I just want to bring that up.

MR. D. POCH: Mr. Chairman, that's a convenient place to break.

THE CHAIRMAN: All right. We will break until tomorrow morning at ten o'clock.

THE REGISTRAR: This hearing will adjourn until ten o'clock tomorrow morning.

---Whereupon the hearing was adjourned at 5:00 p.m, to be reconvened on Wednesday, April 22, 1992, at 10:00 a.m.

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E R R A T A
and
C H A N G E S

To: Volume 133

Date: Tuesday, April 14th, 1992.

Page No.	Line No.	Discrepancy
(v)		Exhibit 605: Leukema s/r Leukaemia Insert Exhibit 609: Document compiled by Sheila Malcomson of Energy Probe, entitled: Global Phase-outs of Nuclear Power. Page 23387
(vi)		0.2.139 s/r 9.2.139